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First Reactions to Guillebaud

AS we go to press, the only railway union to have given an official opinion of the Guillebaud report was the Transport Salaried Staffs' Association, although Mr. Sydney Greene, General Secretary of the National Union of Railwaymen, had expressed a personal view. This was that the report confirmed the N.U.R.'s contention that railwaymen are underpaid and that he hoped the recommendations would lead to a rectification of the situation. Mr. William Webber, General Secretary of T.S.S.A., voiced a wish with which all are now familiar : his union wanted all the money recommended in the report, and his union wanted most of it now. He added that T.S.S.A. appreciated the Commission's difficulties and knew the arguments about subsidies. Nevertheless, the Commission had already been subsidised for a number of years by people in the Commission who had had no voice in policies which had resulted in deficits or profits. T.S.S.A.'s views were given shortly after reports had circulated that the Government favoured an immediate award of the differential increases, followed later by the further 3 per cent which would be necessary to bring last month's interim increase of 5 per cent up to the recommended 8 per cent. T.S.S.A.'s reaction was so quick that it seems the Government will have to think again. Indeed, Mr. Edward Heath, Minister of Labour, has warned his colleagues that a phased programme could offer a threat to labour relations in industry. There is no doubt that the railway pay situation will be watched with interest by trade unionists all over the country. Already, there have been repercussions from London Transport : a spokesman from the Transport & General Workers' Union stated on March 7 that "the position has changed since January" (when the union's claim for a £1-a-week rise had first been presented). The T. & G.W. added that other workers had recently received wage increases. Under last month's interim rail settlement, N.U.R. members on the Underground are to get about 10s. a week extra—this will further widen an already resented wage differential between N.U.R. and T. & G.W.U. workers on London Transport. An Executive official is reported to have suggested a "Guillebaud" inquiry into bus pay : this might provide an answer to the situation if the earlier problem of how to implement its surface railway prototype is first solved.

Our Comment

OUR comment concerns the widespread belief that the Guillebaud recommendation of a simplified pay structure is something entirely new. In his book "Transport Staff Relations," written in 1950 and published early in 1951, Mr. Frank Gilbert, O.B.E., formerly Chief Establishment & Staff Officer on the Central Staff of the British Transport Commission, pointed out the complicated nature of railway pay and conditions and instanced the enormous amount of time wasted "because of the tortuous nature of the arrangements which have grown up over the years." He urged a "comprehensive but much simpler pay-code" and added that the unions would have to show "a readiness to accept some measure of the levelling-down which should go with the levelling-up when anomalies have to be rectified." There was "a pressing need for the job to be done." Apart from some slight simplification made in 1954 (repudiated by the National Union of Railwaymen when the ink was hardly dry on the agreement), nothing came of Mr. Gilbert's proposals. One wonders whether the unions will be any more amenable to those of Mr. Guillebaud and his colleagues in this respect.

Locomotive Engineers and Export Trade

THE annual luncheon of the Institution of Locomotive Engineers, over which Mr. Alfred Smeddle presided, once again was marked not only by the number of members who attended but also by the quality and quantity of the guests. In all there were present 683. The speakers included Dr. Charles Hill, M.P., Chancellor of the Duchy of Lancaster, whose medical allusions to locomotive terms met with an hilarious response from his audience. Sir Brian Robertson, Chairman of the British Transport Commission, was speaking on the day of the publication of the Guillebaud report. His only reference to this was that the date was March 4 and not the Ides of March. On another subject, Sir Brian Robertson also trod warily. He pointed out that he favoured complete co-operation between British Railways' locomotive engineers and those of outside industry. He added that he was willing to make available the services of British Railways officers for such matters as U.K.R.A.S., and that he was sure that the progress being made on British Railways in the locomotive field would provide a shop-window which should be of great assistance to the industry so far as overseas sales were concerned. Where else, he asked, could overseas administrations see such a good comparison of diesel-electric and diesel-hydraulic forms of traction as in this country?

Questions on Railways in Parliament

MANY Members of Parliament realise that the railways should be left as far as possible to manage their affairs without frequent questions in the House on matters of day-to-day administration. The knowledge that actions on matters of detail, or indeed of principle within the prescribed spheres of managerial responsibility, may be called frequently in question,

must cause railway officers to repress that independence and boldness to which all political parties pay lip service. There are ample opportunities for debating railway matters in both Houses. Ministers, nevertheless, were asked recently to be more liberal in deciding what questions they were prepared to answer. Mr. R. A. Butler, Leader of the House, made it clear that the existing rule that Ministers were answerable only on matters for which they had a recognised responsibility, was not to be relaxed; but Members can now ask more general questions, though there is no guarantee that these will be answered. The argument that more information should be forthcoming on appointments to Area Boards of the B.T.C., for which the Commission is responsible, lacks force. Appointment to senior positions in the nationalised industries is a function of management.

C.I.M.A.C. 1962

THE theme of the Sixth International Congress on Combustion Engines (C.I.M.A.C.), which will be held in Copenhagen in June, 1962, will be: "Recent developments with diesel engines and gas turbines above 3,000 h.p. per engine and with gas engines above 1,500 h.p. per engine." While this theme is restricted to higher horsepowers, it is expected to produce technical papers from engineers in most of the C.I.M.A.C. countries. The British National Committee hopes that the United Kingdom will repeat its notable contribution to the 1959 Congress. Intending authors should get in touch with Mr. Malcolm Logan, Hon. Secretary of the British National Committee, C.I.M.A.C., 6, Grafton Street, London, W.1, not later than November 1, 1960. They should provide the following information: name, appointment, and qualifications for the chosen subject; the title of their paper, together with a simple résumé and a synopsis not exceeding two typed pages complete with a list of probable figures, graphs, and tables. This should be furnished in English and French and be sufficiently detailed to indicate the interest of the paper within the framework of the Congress theme.

Overseas Railway Traffics

OPERATING revenues of the Canadian National Railways for the month of January, 1960, amounted to $53,655,000. Expenses, taxes, and rents totalled $60,107,000, resulting in a net operating income deficiency for the month of $6,452,000. In January, 1959, operating revenues were $55,676,000; expenses, taxes, and rents were $60,422,000, and the net operating income deficiency was $4,746,000. Canadian Pacific Railway revenue for January amounted to $35,564,259 compared with $37,157,891 in January 1959. Railway expenses were $35,083,095 ($36,847,038) resulting in net earnings of $481,164 ($310,853). Paraguay Central Railway receipts have declined steadily over the past few weeks in comparison with last year's figures. Receipts for the week ended February 19, amounted to G.1,556,126, a decrease of G.309,729 over the corresponding week of 1959. At the same date aggregate receipts were G.2,011,432 less than for the same period of the previous financial year. Costa Rica Railway receipts for January amounted to colones 2,472,553 compared with colones 2,252,261 in January, 1959, an increase of colones 220,292. Aggregate receipts from July 1, 1959, to January 31, 1960, amounted to colones 14,905,403 (colones 13,239,893).

Rail Link between Egypt and the Sudan

FLOODING of the Nile valley above Assuan, which will result from building the High Dam there, and below Wadi Halfa, on the Egypt-Sudan frontier, some 200 miles upstream, has raised the question of a railway. Shellal, near Assuan, is at the southern extremity of the Egyptian Republic Railways 4-ft. 8½-in. gauge system, and Wadi Halfa is the northern terminus of the 3-ft. 6-in. gauge Sudan Railways. There is at present no railway between these points, and the valley is relatively arid. The Sudan Railways operate steamers between Shellal, immediately above Assuan, and Wadi Halfa. Partly to serve the fertile strip to be created by irrigation, and partly to improve communications between Egypt and the Sudan, the two Governments have agreed on a preliminary basis to establish a fund of £20,000,000 to build a railway, probably standard gauge. The proposed route is reported to be 400 miles long, presumably to allow for a detour round the flooded area. Unless the Wadi Halfa to Khartoum line is widened, the break of gauge remains. The new railway will be another link in the Cape-to-Cairo route.

Shrinkage in Locomotive Coal Demands Overseas

INTRODUCTION of diesel traction on the Nigerian Railway and the Ghana Railway, with gradual elimination of steam haulage, has caused a coal crisis in Nigeria. Both administrations have been obtaining locomotive coal from the Nigerian Coal Corporation, a statutory body exploiting coal measures in that territory. They have reduced and will further reduce their coal requirements. The Nigerian coal industry is not large, and is sensitive to shrinkages in demands even as moderate as those occasioned by increases in the proportion of diesel locomotives in relatively small motive power fleets. The numbers of steam and diesel locomotives on the Nigerian Railway towards the end of last year are given as 272 and 39 respectively; on the Ghana Railway there were 104 coal-burning, 33 oil-burning, and 23 diesel-electric locomotives. In India, where the proportion of diesel and electric motive power is not great in relation to the total, the indigenous coal industry is not yet adversely affected. Indeed the collieries are stated to have failed to meet locomotive coal demands. Elsewhere, turning over to diesel traction has involved disuse of oil-burning steam locomotives.

Additional Tracks on the G.N. Main Line

THE need to increase the frequency and speed of services by increasing line capacity has resulted in plans to quadruple certain additional sections of the Great Northern main line of British Railways, Eastern Region. Some details are given elsewhere in this issue. A decision is now reported to have been made as to additional track between Holme and Yaxley, where the instability of the subsoil would necessitate expensive consolidating work. The former Great Northern Railway widened various lengths as funds were available. The changes in railway economics in the present century are shown by the G.N.R. preference for developing passenger traffic by building new lines in the Nottingham area, in Lincolnshire, and near London, rather than widen further sections of trunk line. In the London area the Enfield–Stevenage loop not only opened up a residential district but has continued to relieve the main line. Its construction avoided costly duplication of Welwyn Viaduct. The latter is to remain double track. Modern signalling minimises its nuisance as a bottle-neck. One may wonder whether its duplication 50 or more years ago would have proved economic in the light of costs then prevailing.

Improvements at Grangemouth Docks

THE Caledonian Railway initiated Grangemouth, on the Firth of Forth, as a modern port in the last century. Now British Transport Docks, as successor to the London Midland & Scottish Railway, which absorbed the Caledonian in 1923, is to embark on a scheme for improvements at Grange Dock, Grangemouth, at an estimated cost of £1,700,000, to meet the growing needs of ocean shipping. Grange Dock has a water area of 30 acres. It is connected with the Forth by a water channel and lock through which vessels drawing up to 25½ ft. can pass on all tides. Recent improvements include new cranage on the East and North Quays and a transit shed on the latter. The three remaining quays to be treated are the South Quay, and the north and south sides of the Tongue, a projection at the western end of the dock. New transit sheds and 65-ft. radius electric cranes are to be provided on the Tongue and the railway layout improved. Reduction in coal shipments has facilitated concentration of the remaining coal traffic in another dock, and the section of the South Quay available for general cargo will be extended, crane and railway tracks renewed, the surface repaved in concrete and new electric cranes provided.

Train Describer Techniques

THE need to provide operators of central signalboxes with a memory device to help to identify the many trains in their charge was stressed by Mr. M. E. Leach, Assistant Signal

Engineer, Western Region, British Railways, in his paper on developments in train describer techniques read last week to the Institution of Railway Signal Engineers. He believes it logical to extend the application of the usual box-to-box storage type train describer by providing a display indicator for each signal section in the layout, on which would be exhibited the description of any train occupying the section; and to transfer automatically the description from one section to the next, on the diagram as the train passes along the route. The system developed by the Western Region, he explains, does not use display indicators or panels used in other systems, but a plan of the lines concerned with a train describer display unit in each signal section. The signalman can see the description of each train in his area and its exact position at any time. A standard telephone dial is used for setting up the description. The code figures for train destinations are dialled as in automatic telephone practice.

Training for Diesel Maintenance

THE significance of student participation in training courses and the use of "live" mock-ups to demonstrate the logical approach to the discovery and correction of faults in diesel-electric traction equipment are stressed by Mr. H. R. Hill, of the General Electric Company, U.S.A., in a paper on the education and training of diesel motive power maintenance staff, presented recently to the Railway Sub-Committee of the Economic Commission for Asia & the Far East. He points out that efficient maintenance is vitally important because of the comparatively short periods spent by diesel locomotives at terminals. Knowledge of and competency in electrical matters are essential. Besides the need to train older established staff in the handling and maintenance of the new type of motive power, apprentice training has to be abnormally thorough under instructors selected not only for their technical knowledge but also their ability to teach. Theory and practice must be blended at all times, and the reasons for doing things explained and grasped. New ideas and methods occurring to and practised by trainees should be encouraged, sometimes with valuable results.

Still Waiting

AFTER the long wait for Guillebaud, the railways and the country are now waiting for the Government to decide in what way and to what extent the report of the independent committee into railway pay is to be implemented. The report, which is summarised elsewhere in this issue, is unusually lucid and the result of the exercise of extreme care and impartiality. Its findings have been accepted almost without question, and there is considerable sympathy for its main recommendations. Briefly, it suggests an overall increase of 8 and 10 per cent for conciliation and salaried grades respectively, plus further percentage rises for special skills and responsibilities, bringing the maximum total pay to a figure in the region of 18 per cent higher than any at present existing in the groups under consideration. This must be done if the relevant grades are to receive pay equivalent to that paid for comparable work outside the railway structure.

The report contains many interesting observations. In respect of career and promotion prospects for conciliation staff, it doubts "if there is any other (industry) which offers such a wide range of opportunity to a new recruit in wage-earning grades." On the other hand, the prospects offered to salaried staff do not appear to be better than those given by the general level of outside industry, if indeed they come up to that level. The long-vaunted attraction of the steady railway job appears to have lost its force for both conciliation grades and for salaried grades: in the first category, its effect is cancelled out by full employment and made less certain by modernisation; in the second, it does not appear to be more a fact on the railways than in similar employment elsewhere. The value of free and cheap travel was another railway benefit affecting the categories differently: it seemed to have a greater value for conciliation than for salaried staff, although facilities granted to the latter group were more numerous and probably used to a greater extent than in the case of the conciliation grades. Nevertheless, the committee thought that the travel concessions represented a substantial advantage to all railwaymen and their families. They had been one of the factors which had influenced the recommendation of a lower basic increase for conciliation grades than for salaried staff, and every increase in railway fares enhanced their value.

The report also points out that the country possesses only one labour market which must be influenced, even if only at a limited pace, by wage differences. This is a factor to which attention is frequently drawn by both Government and independent economists, and one which must be receiving close Government attention at the present time. For the same basic reason, the committee's observation is important that uniform increases leave grave anomalies uncorrected: such increases during and after the 1939-45 war have diminished the real values of differentials and have been the source of constant dissatisfaction and, therefore, of potential change of work. In this connection, the suggestion that the present multiplicity of railway conciliation grades be reduced to 12, though practical and welcome, probably will meet with opposition from men who value any difference, however small, which marks them off from the next man below. For allied reasons, simplification of the grades and methods of clerical staff is unlikely to find general favour among affected categories, despite the fact that the recommendation has all the force of reason and experience behind it. In particular, an Organisation & Methods Department, which has been suggested by the report, would probably be bitterly resented.

Enhanced differentials over and above the flat increases represent a common-sense measure which must be carried out if there is not to be further anger among railwaymen: the 5 per cent interim award will already have affected the small differentials referred to by the report as more in keeping with the nineteenth than the twentieth century. If the Government decides that the report cannot be implemented in its entirety, some increases certainly ought to be made to bring about a revised pay structure incorporating the recommended proportions, if not the exact amounts envisaged. The committee believes that the rates of all conciliation grades should be raised by 8 per cent, then that "out of line" workers should receive a further 5 per cent, and that "badly out of line" categories should receive a 10 per cent increase, making a total increase of 18 per cent. It further believes that a provisional set of grades should be drawn up with rates ranging from the lowest to the highest of these recalculated rates, and that each grade should be grouped under the new grade whose rate came nearest to its recalculated rate. This would mean that some men would gain slightly more than others, and it was because of this that stress was laid on the necessity of a further general increase. Ideally, this course would seem to be the best: in the event, the Government may find it difficult to permit the award of the suggested differentials on top of the recently granted interim increase of 5 per cent.

Provision for meals, rest-rooms, and sanitary facilities were found by the committee's investigators to be generally unsatisfactory and frequently inferior to those provided in most other industries. It is difficult to understand why such a long-standing and legitimate railway grievance has not yet received satisfactory attention, and it is to be hoped that the problems involved will be solved in the near future. Relatively straightforward, they should not present too much difficulty. Another reform considered necessary by the committee was the separation, for purposes of negotiation, of conciliation and salaried staff at the level of the Railway Staff National Council. On this the General Secretary of the Transport Salaried Staff Association, Mr. William Webber, has commented that the report merely vindicates the arguments he and his union have been using for years: if the suggestion had been in operation a few weeks ago, T.S.S.A. would not have been involved in the difficulties of that time.

Reference is made to union and other reaction in the first editorial note in this issue.

Inquiry into Nigerian Railway Corporation

DESPITE the excellent results achieved by the Nigerian Railway Corporation during the year ended March 31, 1959, there has been growing concern over the intensification of road transport competition. Mr. R. A. Njoku, Federal Minister of Transport & Aviation, stated in a broadcast talk on February 25, that the economic situation of the Corporation was a source of great anxiety to the Federal Government, because the Corporation was in danger of deficits which might in 1959-60 amount to £1,000,000. This, he stated, might

continue in future years unless remedial action was taken.

Accordingly the Federal Government has decided to appoint a Commission, under the Commissions of Inquiry Ordinance, to inquire into the economics, administration, and industrial relations of the Nigerian Railway Corporation and to make recommendations to the Federal Government. The Commission will consist of a Chairman with legal experience and two members, one of whom will be an expert in railway administration and the other in economics. The names of the Commissioners will be announced later.

The Minister believes that the main trouble facing the Corporation lies in the increasing recurrent expenditure. Citing an example of this, he said that the Corporation was at present spending 55 per cent of its revenue on staff costs while in 1954-55, the corresponding figure was 37 per cent and the profit more than £3,000,000.

Commenting on the fall in groundnut production and competition by road transporters, Mr. Njoku announced that the Council of Ministers had directed that the Joint Planning Committee should examine the possibility of co-ordinating all forms of surface transport. The necessary statistical studies were now in hand but would take time, especially in the field of road transport.

Reviewing the staff position of the Corporation, the Minister gave the employment figures as contained in the Corporation's last annual report as 33,323, 3,000 of whom are employed on capital works. This figure, Mr. Njoku said, was unduly high for a railway with 1,780 route miles, compared with the Rhodesia Railways with a revenue of £28,000,000, roughly double that of Nigeria, which employs 33,000 people on a route mileage of 2,740.

Retrenchment, Mr. Njoku stated, although disagreeable, was sometimes inevitable. He stressed that when it became inevitable to reduce the staff of the Nigerian Railway Corporation, the reduction must affect expatriate staff along with Nigerians. Every dispensable expatriate contract officer, he added, should first be got rid of, before any large number of Nigerian employees could be retrenched.

It is to be hoped that the efficiency and experience of the British officers is to be borne in mind.

Aspects of Rail-Road Co-ordination

PROBLEMS of the co-ordination of railway and road transport in Britain were admirably outlined by Mr. A. J. White, who retired recently from the position of Assistant General Manager, British Railways, Eastern Region, in his paper read last Monday to the Metropolitan Section of the Institute of Transport. Space allows only brief mention of the many points made. He wisely does not attempt to define co-ordination of the means of transport.

His main contention is that there is little co-ordination in the United Kingdom today because legislation and public opinion have usually acted to drive them apart. In consequence of the unequal conditions in which the railways have been forced, and road transport allowed, to operate, the natural balance of functions has been disturbed. The roads are severely congested, and the railways are under-used and in deficit; both conditions are likely to grow worse if matters continue as they are now. Congestion on the roads, he believes, could be relieved at small expense, general railway subsidies avoided and the rising cost of inland transport held in check if railways and roads were used more in combination and less in competition.

To create a climate favourable to voluntary co-ordination, in his view, it is necessary to equalise, so far as is practicable, the conditions in which the two forms of transport operate. Specifically, track costs should be brought into line. Payment of interest on "historic" capital expenditure should cease. Losses on unremunerative services maintained or provided for their social value should be compensated from public funds. Until the necessary legislation is fully operative, railway deficits should be covered by grants instead of by interest-bearing loans. The increased probability of further large additions to the railway wages bill as a result of the publication of the Guillebaud Committee report, does not, in his opinion, invalidate any of his suggestions or conclusions, but strengthens the case for a realistic treatment of the conditions in which rail and road transport are to operate.

Development of road door-to-door freight services after the first world war by large numbers of small independent hauliers, rather than by the established transport agencies, was the result, he points out, more of a series of historical accidents than of any conscious intention. The railways, pre-occupied by problems of ownership and organisation, were slow to ask for road haulage powers and by the time they did so the road interests were too strong. The "Square Deal" campaign initiated before the war of 1939-45 in an attempt to redress the unfair disadvantage under which the railways laboured, might have achieved something, but the war intervened. The railways emerged from the war physically exhausted and in a worse bargaining position than ever.

On the passenger side, although local tramway and bus services concentrated on local movements, they served the important railway stations only incidentally. Mr. White considers that long-distance rail and short-distance bus services have arranged themselves in complementary fashion to a reasonable degree—a view which many will dispute. As many short-distance passengers transferred in large numbers from the railway to the more convenient buses it soon became evident that there was no future for many branch and intermediate-station passenger services. Little was done to co-ordinate local road and rail activities, for the road operators were content with the way things were going.

A notable feature of this period is not rail-road co-ordination which happened almost accidentally, but the co-operative arrangements between road operators, municipally and privately owned, that emerged from the first years of uncontrolled competition. Although constructive legislation helped a good deal, he observes, the delineation of operating areas and agreements for joint services and through running took place largely on the initiative of the operators themselves, because they had a common interest in bringing order out of confusion.

The Transport Act of 1947 might have worked fairly successfully if it had grasped the nettle of private transport. But in view of the attitude of the business community towards State ownership, it was clear that the free grant of "C"-licences would be exploited to the full and the Act, he stresses, shirked the issue. Strict control over railway charges was retained and nothing was done to relieve the railways of statutory and other financial burdens inherited from their monopoly days. The growth of the motor industry was encouraged and railway modernisation delayed. In the meantime private road transport continues to grow and the road vehicle industry apparently sees no limit to its expansion. Against such a background, he adds, co-ordination "has been characterised as a device to bolster up bankrupt and redundant railways."

Railways and road operators in the public service, lined up together by force of circumstances, may find it profitable to co-operate. With goods transport that would not exclude the possibility of trunk haulage arrangements between the railways and "C"-licence holders, but Mr White holds that the interests of the public hauliers would best be served by co-ordinating their activities with those of the railways over medium and longer distances.

Congestion of the roads is changing the situation. Road transport obtained the use of a road system capable initially of carrying much additional traffic without the need for much in the way of additional tracks or irksome track disciplines. That stage has already been passed. Road improvements may well increase capacity, which is likely to be absorbed faster than it can be created, especially in cities. Track and terminal disciplines will have to be accepted wherever congestion occurs, beginning with effective restrictions on street parking with perhaps even prohibition use of certain streets by certain classes of vehicle. In the U.S.A., he points out, it is openly stated that "auto-dominant" systems of urban transport are "infeasible." City after city is calling for express bus services and new railways on, above, or below ground level. In the newer conurbations in America, the population is so thinly spread that public rapid-transit systems could have little hope of paying their way.

As to passenger transport in cities, the first step is to prohibit parking wherever it causes obstruction. Public service vehicles must run faster; in heavily congested areas this can be done only by giving them separate lanes or whole streets from which private vehicles would be excluded. This, Mr. White believes, could produce an enormous increase in seat-miles at practically no cost. The third step is to stagger business hours

compulsorily. Transport demands are certain to grow. It may well be necessary to build new tube railways, in London and some provincial cities, and to modernise the surface lines not yet so treated. In the outer suburban areas, and beyond, car parks should be provided and efforts made to ensure that bus routes serve the stations.

As regards withdrawal of unremunerative country rail and bus services, he is right in his view that mechanisation of agriculture and the attractions of the towns, not the withdrawal of public transport, are checking the growth of rural populations. Increasing private transport, only slightly offset so far by the closing branch lines and withdrawing buses, has restrained rather than accelerated a permanent exodus from the villages. On the whole, in his opinion, which many people do not share, the co-ordination of long-distance rail and local bus services has gone as far as is economically justifiable and physically possible at present.

The picture of co-ordinated transport, as drawn by Mr. White, provides for a network of road-rail exchange depots, perhaps 20-30 miles apart, to which general merchandise in container loads would be brought by road, there to be loaded on to flat wagons and despatched in fast braked trains to other depots from which the containers would be delivered home by road. In the U.S.A. " piggy-back " trains are common enough, and although this form of transport is not possible in this country, because of the restricted loading gauge, containers are a good substitute. Another development is the road-rail transferable trailer, which is being developed in this country as the result of an experiment in the U.S.A., and promises well.

As to subsidies, he does not believe that railwaymen would immediately become lackadaisical or irresponsible if deficits created, in their view, by no fault of their own, were met from the public purse. This is a controversial view: many people are opposed to subsidies of any sort because of their effect on morale. He states that it is essential to distinguish general subsidies, " which look like free gifts," from payments for services rendered but inadequately rewarded by the users. Annual grants to cover deficits, however losses were incurred, might well be demoralising; the perpetual controls and inquiries which would inevitably accompany such grants would certainly destroy managerial initiative, for managers would naturally concentrate on avoiding mistakes. Payment for services rendered to the community, he maintains, in effect making up losses on activities unprofitable in themselves but socially necessary, would be quite a different thing.

Reaping the Benefits of Modernisation

THE current year may well prove to be a turning point in the affairs of British Railways. Merchandise and mineral receipts have been rising in recent weeks, as is shown by the figures issued by the British Transport Commission and published in our columns. As Sir Brian Robertson, Chairman of the Commission, pointed out last week to the Timber Trade Federation at its annual dinner at Grosvenor House, London, the low receipts during the last two years are largely the result of the recession in heavy industry in 1958, from which it has taken the railways time to recover. Only at the end of 1959 were effects then thrown off. The fact that the recession cost British Railways £30,000,000 serves, as he remarked, to emphasise their inherently strong position as movers of raw materials in bulk.

Another factor restricting receipts early in the year was the threat of a railway strike, which lost some business. The most recent figures appear to support Sir Brian Robertson's impression that most of this traffic is being recaptured. If the strike had occurred, much traffic would have been lost for good, because potential consignors would have acquired their own " C "-licence vehicles. As it is, buoyant trade conditions and the growing impetus of implementation of plans for modernising and re-equipping the railways are having a very real effect on railway business, goods and passenger.

Despite intense activity in all spheres of railway work, some time must elapse before the public enjoys the benefits. Only in 1964, for instance, will it be possible for passengers and goods to be moved by electrically-hauled trains between London, Birmingham, Crewe, Manchester, and Liverpool, over the first trunk line to be converted in Britain and the first major electrification at 25 kV., 50 cycles. In fact, the completion of this work by then will be a creditable achievement. Apart from the magnitude of the task of converting many miles of route, much of it four-track, and of designing and building the large amount of motive power and rolling stock required, a great deal of civil engineering work has been necessitated by the need to provide adequate clearances in overline bridges and other structures. Conversion has already been accelerated, so as to realise the benefits of electrification as soon as possible; and this has caused inevitable decelerations and other alterations in the timetables, and some delays.

Electrification of the Crewe-Manchester section will be completed this year. Once the techniques have been mastered and rhythm achieved in production of materials for electrification and in installation of equipment and building locomotives and rolling stock, the pace of conversion will probably increase, as has been the case in other countries where large-scale electrification has taken place. Although conversion north of Crewe is not yet in the programme, Sir Brian Robertson hopes with reasonable assurance that he " may live long enough to see the first electrically hauled train leave Euston for Glasgow Central." A series of smaller electrification schemes will be completed and come into service this year and the succeeding three years. These will improve travelling conditions for many thousands who journey daily to and from their work in London and Glasgow. Meanwhile diesel traction has spread with marked success into many areas of the country for both passenger and freight operations. There will be a large increase in diesel traction in the Eastern and Western Regions during the next 12 months. As to goods traffic, plans are based on the rail trunk haul, with zonal deliveries from key points on the trunk routes to keep up the overall rapid flow of movement from door to door. Associated with this is the new concept of railway freight movement, with delegation of management with better and closer relationships with the railways' customers.

Regarding the difficult financial problems which face the British Transport Commission, Sir Brian Robertson made it clear that the financial difficulties which stemmed largely from the financial structure of the Commission were quite a different matter from the temporary difficulties which resulted from operating out-dated railways during the process of their modernisation and reconstruction. Last year the Commission recommended that the financial structure of its organisation should receive fresh consideration. This is now being done. But so far as the actual operation of the railways is concerned, Sir Brian Robertson is rightly confident that the modernised system will yield a rich dividend to industry and to the travelling public.

New South Wales Government Railways

THE report for the year ended June 30, 1959, of the Department of Railways, New South Wales, a copy of which we have received from Mr. N. McCusker, Commissioner of Railways, shows that net income increased appreciably on the previous year's figures. This was largely due to the increased volume of freight business handled with the consequent increase in operating revenue. Overall freight services, measured in ton miles, showed an increase of 6·4 per cent. Although freight earnings on coal, coke, and fodder were noticeably less than for 1957-58, earnings rose sharply on the carriage of wheat, flour, wool, general goods, ores, and concentrates.

Passenger traffic continued to decline, some 4,500,000 less passengers being carried on rail. While frequent air services operating from most major towns have contributed towards this trend, the continual improvement in roads, the large increase in private motorcar ownership, and the extension of suburban shopping centres, have been major factors affecting passenger business. The total of concessions allowed was £485,634. This figure was made up of direct losses of revenue incurred in the transport, at reduced rates, of stores stock, of stock travelling to and from agistment and the carriage of fodder for starving stock (£154,703); rebates of freight to consignors of mill products, export flour, rice, canned fruits, hams and other goods (£295,981); and concessions to blind ex-servicemen and their guides (£34,950).

Despite a continued rise in wage costs, during the year, net operating expenses were £1,221,899 lower than for 1957-58. The benefits of diesel traction, improved methods of operation, and greater efficiency arising from the cumulative effects of planned capital improvements, all contributed, in varying

degrees, to a saving of operating expenses for the year. The profit on operations for the year was £4,828,542, an increase of £2,929,590 on the previous year's figures. This profit was not sufficient to offset the heavy fixed charges, and the net result was a deficit of £6,449,363, an improvement of £1,735,820 on the previous year's figures.

Some of the principal results were as follow:—

	1957-58	1958-59
Total miles open	6,103	6,103
Total Earnings	£74,432,599	£75,930,792
Working expenses	£72,533,647	£71,102,250
Balance	£1,898,952	£4,828,542
Percentage of profit to capital invested	0·7	1·7
Percentage of working expenses to earnings ...	97·45	93·64
Earnings per train mile	510·09d.	517·75d.
Passenger journeys	258,650,735	254,055,033
Goods tonnage	17,802,452	18,973,005

Within the limits of capital fund allocations, the Department has continued its programme of modernisation. On the Hornsby-Gosford electrification project, the section to Hawkesbury River was opened for traffic by April, 1959, seven weeks ahead of schedule. Work on the Clyde-Carlingford electrification project has been commenced while considerable improvements in the Port Kembla area, to meet the requirements of that Port's industrial growth, are being carried out.

Many new units of rolling stock have been received and placed into service, principal among them being the inter-urban stainless-steel trains for specialised passenger services on the Western line, and air-conditioned diesel trains for use between Werris Creek, Moree and Burren. Continued emphasis was placed on the efforts to increase revenue from the lease of railway land not immediately required for departmental purposes. The net revenue from this source for the year exceeded the estimate by £8,666 and reached £561,166, as compared with a total of £460,783 for the previous financial year.

The most pressing problem involving staff concerned the introduction of diesel motive power. The gradual and progressive introduction of diesel locomotives into the system has caused, and will continue to cause, changes in the methods of operation and maintenance at the various locomotive depots. These changes will necessitate adjustment of staff who were previously engaged on the maintenance and servicing of steam locomotives which are now being displaced.

The systematic introduction of diesel locomotives continued during the year with the delivery of 22 new diesel-electric units. The main-line units have been used principally in connection with the progressive elimination of steam locomotives on the section Broadmeadow-Taree and the provision of special overnight fast goods services to the larger commercial centres in New South Wales. Tenders were invited and orders placed for 20 additional main-line diesel-electric locomotives, 26 branch-line locomotives, and 10 diesel-hydraulic shunting type locomotives.

Signalling alterations, including re-arrangement of existing interlocking facilities at Hornsby, Cowan, and Hawkesbury River, were completed in conjunction with the opening of electrified services to Cowan and Hawkesbury River. Existing lower and upper quadrant signals were replaced by single-light indication colour-light signals spaced at intervals to provide suitable headway for electric services. The installation of automatic and power signalling between Penrith and Lithgow was completed and the remaining sections of manual block working were abolished. Considerable economies have been possible through the abolition of a number of signalboxes on this section and the installation of closing facilities on the remainder.

LETTERS TO THE EDITOR

(*The Editor is not responsible for opinions of correspondents*)

Writing on the Right Lines

February 23

SIR,—Referring to recent correspondence, I give two examples of recent use of wrong words by railway staff, apparently for no reason. A circular letter states: " There is some dubiety about . . .;" the obvious word was " doubt." A letter to a firm, which regretted that their goods had not been traced " more quickly " (instead of " sooner "). Printed posters, no doubt duplicated hundreds of times from time to time, announce " Fog service in force " instead of " in operation." Another poster states: " Repairs in hand;" the words should be " repairs in progress."

Foreign visitors, proud of their academic English and eager to try it out, must be sorely puzzled by this misuse of words.

Yours faithfully,

JAMES P. CUNNINGHAM.

106, Harcourt Avenue, E.12

A Sample of Vitalised Statistics

March 3

SIR,—Since 1950 the Bureau of Railway Economics, Association of American Railroads, has compiled annual indexes of charge-out prices for fuel (coal and oil), materials, and supplies and wage rates (for all employees). The indexes are based on a figure of 100, representing the mid-year average of 1947 to 1949. In point of time they correspond to the consumption of fuel and materials and to charges against operating expenses. As a general rule one month's supply of fuel is kept on hand and five months stock of materials.

On February 3, the A.A.R. announced that the fuel index rose from 101 in 1950 to 117 in 1959, while the materials index advanced from 109 to 160 and the gauge of wage rates soared from 121 to 195, an increase of 61 per cent. A combined index for prices and wages rates moved up from 116 in 1950 to 180 in 1959, a rise of 55 per cent.

The A.A.R. also circulates quarterly indexes, on the same basis, of spot purchase prices for fuel, timber, iron and steel, and miscellaneous supplies. These show a decline in fuel prices after 1957, but a rise in other prices to their highest level in January this year. An unkind blow is a rise in steel prices of 67 per cent since 1950, for the railroads were always good customers of the steelmakers and their operating services were an indispensable aid to the development of the industry.

Yours faithfully,

R. BELL.

Clacton-on-Sea

First All Roller-Bearing Locomotive

February 28

SIR,—Mr. J. T. Emmerton comments in your February 26 issue on my letter published on January 22.

If he is in a position to correct me on railroad history, I shall be the first to appreciate it, for it has been my hobby for 25 years. Far from proving my statements to be inaccurate, he has confirmed them. Most of the details he mentioned I was already aware of; but the fact remains that only after the last war did roller bearings in any quantity begin to appear in this country for application to locomotives and rolling stock.

If Mr. Emmerton wishes me to quote figures of locomotives and vehicles equipped with roller bearings, as opposed to plain or white-metal oil box types, I shall be happy to find out for him. It is clear to any observer that there are still many more locomotives without, than there are with, roller bearings. Multiple-unit stock and some British Railways cross-country stock of " C. 1 " restriction are certainly so equipped, but they are very much in the minority.

I am not levelling any charges at British Railways, for it was not until nationalisation that this important improvement began to be effected seriously. I still consider, however, that the railways of Britain are far behind those of other countries in use of roller bearings, a view that Mr. Emmerton has not yet proved to be inaccurate.

Yours faithfully,

C. P. LOVEMORE, ASSOC.I.R.S.E.

13, Elliston Road, Redland, Bristol, 6

THE SCRAP HEAP

Off the Rails

He keeps getting into trouble since he gave up his job on the trains—Hastings witness.—*From "The Evening News."*

Revolutionary Reading

A correspondent tells me he found Sir John Elliot's book "The Way of the Tumbrils" on sale in the all Pullman Red Dragon express from Swansea the other day. The bar tender said he had sold three dozen copies in five months—and had read it himself three times with enjoyment. My correspondent invites me to raise my eyebrows because Sir John is Chairman of the Pullman Car Company and Thos. Cook, which are part of the British Transport Commission. My eyebrows are unmoved. No one is compelled to buy the book. Better a book by the Chairman than no book at all on a long journey.—"*Peterborough*" *in* "*The Daily Telegraph.*"

[The train referred to is the "South Wales Pullman." The Pullman Car Company is a subsidiary of the B.T.C., which also holds the capital of Thos. Cook & Son Ltd.—ED. *R.G.*]

Abandoned Termini in Berlin

The reorganisation of passenger services of the German State Railway (of the Democratic Republic), involving disuse of certain large stations, mainly with a view to by-passing the Western Sector of the city, was described in our issue of August 8, 1952. Several stations suffered extensive bomb damage in the last war. The illustrations show two termini abandoned some years ago, and now demolished or in course of demolition. The Lehrter Bahnhof, closed in 1951, was the terminus of the Berlin-Hamburg expresses, including the "Flying Hamburger" multiple-unit diesel train of the 1930's, for some time the fastest train in the world. The Anhalter Bahnhof was served by expresses to and from South Germany, Czechoslovakia, Austria, Switzerland, Italy, and S.E. Europe. The four-track west-to-east Stadtbahn is traversed by certain trains to and from the Federal Republic (Western Germany).

Forestalling Complaints

London Transport Executive apologised in advance to communities near the six-mile open section of the Piccadilly Line between South Harrow and North Ealing where track maintenance by night began recently. Local authorities were sent a letter which explained that a mechanical ballast tamping machine would be in use for the repair job over this section of line during the night and warning that some noise would be inevitable. The tamper covers about three-quarters of a mile of track in a night and the work will have lasted about a month, without working at week-ends.

British Railway Relic for Melbourne

A granite sleeper block, weighing 5 cwt., from the Surrey Iron Railway, opened in 1803, is to be sent to the Museum of Applied Science in Melbourne. Mr. Henry E. Bolte, Premier of Victoria, has accepted the granite sleeper block, part of the rail bed, as a gift from Mr. Chalmers Kearney, of Burgh Heath, Surrey. Mr. Kearney, who was at school in Victoria, has pointed out that traces of the Surrey Iron Railway are still to be found in the Croydon area. He feels it appropriate that the block, a relic of the earliest days of railways, should go to Victoria, where the first railway in Australia was built from his birthplace, Geelong, to Melbourne. The horse-drawn trains of the Surrey Iron Railway and its extension, the Croydon, Merstham & Godstone Railway, were used principally for coal and limestone.

Ode to British Railways

Of British Railways let us sing:
Of C.T.C. and signalling,
Of traction and of rolling stock,
Of interlocking and the block,
Electric rakes and diesel sets,
Of turbines and of superhets,
Of fuel and consumption rates,
The latest types of crossing gates,
Ignitrons, rectifiers, coils;
Of lubricating grease and oils,
Of points and crossings and their frogs,
Of rails and sleepers, chairs and dogs,
Of electronics and automation,
And prizes for the best-kept station—
All these and many another thing;
Of British Railways let us sing:
The engine drivers, firemen, porters,
The fitters, boiler-makers, sorters,
The gangers and the depot men,
The C.M.E. and C.G.M.,
Platelayers, pointsmen, and technicians,
Clerks, draughtsmen, cleaners, electricians,
The traffic men and engineers,
The little boy who waves and cheers,
And stands about in sun and rain,
To spot the very latest train.
Sir Brian Robertson and me,
On one point now we all agree:
Here is a huge conglomeration
That interests all the British nation.
To British Railways let us sing,
And may God speed our journeying.

F.

Photos] [*A. Earle Edwards*

Interior of Lehrter Bhf.; bridge carrying Stadtbahn tracks in background

Part of frontage of Anhalter Bhf., badly damaged during the war

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

SOUTH AFRICA

Reduction in Claims

The most recent review of claims against the railways arising from pilferages and thefts, shortages and various kinds of damage covers the period April to October, 1959. The number of claims paid dropped from 73,061 during the April-October, 1958, period, to 58,571, a reduction of 14,490; the amount claimed dropped by £107,938, and the amount paid out by £111,080. Compensation paid out in respect of pilferages and thefts during the same period of 1959 amounted to £20,097— £4,834 less than during the corresponding seven months of 1958.

New Rolling Stock

During the last quarter of 1959, the South African Railways placed 18 electric and 11 diesel-electric locomotives in service, as well as 26 saloons of the caboose type and 1,268 goods wagons of various classes. Three locomotives, 14 passenger vehicles, and 902 goods wagons were withdrawn from service and scrapped during the same period.

NIGERIA

Inquiry into Railways

The Minister of Transport, Mr. R. A. Njoku, announced last week that the Government would appoint a commission to inquire into the Nigerian Railway Corporation. Railwaymen have threatened to strike. They are demanding the removal of British officers who, they allege, are occupying posts for which Nigerians are qualified.

INDIA

Supply of Coal Wagons

Increased demands have been made for open coal wagons for collieries in the Asansol area fitted with mechanical loading plants. Movement of coal will be improved when bogie wagons are used. The railways are stated not to be delivering enough coal of grades suitable for their needs.

Catering at Stations

The Railway Board has decided not to extend departmental catering to any more stations. This decision has been taken so as to improve first the quality of departmental catering at over 100 stations. The object for which departmental catering was introduced, to set standards for other caterers on the railways, is considered to have been fulfilled for the time being.

The railways started gradual introduction of departmental catering to replace private contracts after submission of the report of a committee appointed in 1954. The main recommendation was that the railways should departmentalise catering establishments at large stations. This has been done progressively since 1955-56. At present departmental catering is done at 101 stations and in 13 pairs of trains.

CEYLON

New Motive Power

All 25 of the new 880-b.h.p. diesel-hydraulic railcars from the Nuremberg works of M.A.N. have now arrived in Colombo, and are to be introduced into service as soon as possible, as the locally built trailers and control trailers become available. Normal formation is to be a railcar, two trailers and one control trailer, with up to four sets coupled in multiple. With the 15 previously built Schindler 800-b.h.p. railcars they will enable almost the entire inner and outer Colombo suburban and local services to be diesel operated; but to make the service entirely diesel and also provide stock for a few other services, it is proposed to acquire another five similar railcars.

NEW ZEALAND

Control of Weeds on Railway Land

To control noxious weeds on railway land, farmers are to be invited to occupy land adjoining railway land in rural areas. The Minister of Railways, Mr. M. Moohan, has emphasised the importance of controlling weeds on railway land, if adjoining lands are to remain weed-free.

After discussions with the Federated Farmers and the New Zealand Counties' Association, the Minister stated farmers would be invited to occupy adjoining railway land in rural areas. It was proposed that, where practicable, fences should be moved in as near as possible to the track. The Railways Department would supply any materials necessary, and the landowner, the labour. A reasonable rental would be charged, subject to the provision that where the condition of the land justified it, neither rental nor rates would be payable for periods up to seven years.

VICTORIA

Iron and Steel Traffic

Mr. A. J. Fraser, the Acting Minister of Transport has stated that greater business in iron, steel, and tin-plate traffic by rail between Victoria and New South Wales is a sign that railway efforts for more business are meeting with success. As well as train loads of up to 500 tons of steel from New South Wales, a shipment of approximately 500 tons of tinplate left Port Kembla, N.S.W., for Melbourne on January 19. It arrived at South Dynon Interstate goods terminal on the following morning, where it was handled with front-end loaders.

In the reverse direction, scrap metal is being railed from Melbourne to New South Wales. To facilitate its loading, a steel derrick crane, equipped with an electro-magnet, has been erected at North Dynon. The Victorian Railways has only two other electro-magnetic cranes, one at Spotswood Reclamation Depot and the other at Wodonga Station, where loadings are transferred between the Victorian and N.S.W. gauge tracks.

Ballast for Standard-Gauge Line

Stone crushing plants at Dysart, Euroa, Glenrowan, and Barnawartha will soon be supplying ballast for the standard-gauge rail track from Albury to Melbourne. The Glenrowan plant is already in operation. When ballasting is completed 700,000 cu. yd. of specially graded stone will be spread over the entire length of track to a depth of 10 in.

BRAZIL

Central Railway Improvements

In 1959 the Central Railway of Brazil completed the Rio-Sao Paulo re-alignments, duplicated and electrified the Sao Paulo suburban lines, and began laying 5-ft. 3-in. gauge tracks on the Bananal branch of the Barra Mansa-Volta Redonda line and between Belo Horizonte and Sete Lagoas on the Pirapora line. It is now extending its tracks to Luiziana, where they will connect with the Goias Railway extension from Pires do Rio to Brasilia, the new Federal capital.

SPAIN

Freedom in Rate Quotation

The R.E.N.F.E. has been accorded additional freedom in negotiating goods rates, subject to certain limitations, including notification of the agreed rates to the Ministry of Public Works.

PORTUGAL

Locomotive and Vehicle Requirements

Forty locomotives, electric or diesel-electric, three refreshment cars, and 36 other passenger vehicles are among requirements for which orders are being placed. The electric locomotives are for the Lisbon–Oporto main line, conversion of which is due for completion within two years.

HUNGARY

Rolling Stock for Roumania

An agreement signed recently by Hungary and Roumania provides for manufacture in Hungary of rolling stock for the Roumanian State Railways. The types of vehicle are not specified. It is possible that diesel locomotives or railcars are included. Roumania in turn is to supply Hungary with certain types of railway vehicles.

Report of the Railway Pay Committee of Inquiry

A summary of the report, which examines wages, salaries, benefits, and conditions of service obtained by conciliation and certain salaried staff on British Railways, and compares these with rewards given for comparable work outside the railway structure

THE Guillebaud Report falls into five sections. Each, except the introduction, is sub-divided into further parts.

Part I—Introduction

The committee was appointed by the British Transport Commission and the Associated Society of Locomotive Engineers & Firemen, the National Union of Railwaymen, and the Transport Salaried Staffs Association to conduct an inquiry into railway pay. In turn, the committee appointed Mr. H. A. Whitson, O.B.E., formerly a senior conciliation officer in the Ministry of Labour, to act as secretary.

Its terms of reference were as follow:—

"To conduct an investigation into the relativity of pay of salaried and conciliation staff in British Railways covered by the machinery of negotiation for railway staff with the pay of staff in other nationalised industries, public services, and appropriate private undertakings, as agreed between the parties or on the instigation of the independent body, where reasonable and useful comparisons can be made, and in relation to any such comparisons

(i) to establish the degree of job comparability;

(ii) to ascertain rates of pay and such other emoluments of the jobs compared as may be properly taken into account;

(iii) to take account of all such other factors as the body may consider relevant in assessing the comparability of the jobs.

"To present to the Commission and the three railway trade unions with as little delay as possible a report setting out objectively the ascertained facts, together with such general observations and conclusions as it may consider appropriate on matters within the terms of reference.

"In conducting its examination the independent body will pay due regard to the existing railway wages and salaries structure and may draw attention to any feature of that structure which it considers should be brought to the notice of the parties."

The report would be considered by the parties to the recognised negotiating machinery. Sources of information would not be disclosed.

Neither the Commission nor the trade unions would enter into any prior commitments on the report of the body, but "the parties recognise(d) that without a genuine desire to reach a reasonable settlement of pay issues the object of setting up the inquiry would not be achieved."

The body would comprise a chairman and two members approved by Commission and unions. The chairman and members of the body were not to be drawn from the Commission or any of the three railway trade unions.

An advisory committee was appointed which included the deputy chairman of the Commission and the general secretaries of the three railway unions. This committee subsequently amplified the terms of reference of the independent committee of inquiry as follows:—

1. Railway occupations not comparable with jobs in outside industry were to be compared with similar occupations within the railway structure for which comparisons could be found.

2. Comparisons regarding salaried staff should be made on the following factors, as well as on basic rates of pay:—

(i) weekly hours of duty
(ii) rates of pay for hours not covered by the normal working week
(iii) annual leave
(iv) Bank and Public Holidays
(v) sick pay
(vi) superannuation benefits
(vii) travelling facilities
(viii) educational standards required on entry to the railway clerical grades.

3. That apparently comparable jobs in outside industry be particularly examined for degree of comparability of work, responsibility, and wages structure.

The first meeting of the independent committee was held on December 3, 1958, and the first two months of office were occupied in planning and finding necessary staff. It was not until February 16, 1959, that work actually began on the inquiry.

The committee's suggestion that it should confine itself to comparisons of key grades was accepted by the Joint Advisory Committee to a limited degree only—that of comparability; it was considered that an overall study of all grades covered by the terms of reference was necessary to ensure a proper appreciation of the responsibilities of supervisory staff. Efforts were made by the Joint Advisory Committee to ensure that visits to each railway region would include a proper cross-section of establishments of all sizes. The whole programme of proposed investigation was made available to the independent committee on June 26, 1959.

Coverage

The programme covered passenger and goods stations, traffic yards, motive power depots, permanent way sections, signal engineering areas, carriage and wagon engineering areas, railway-owned docks, Headquarters and District offices and overhead line maintenance work. Arrangements were made for the committee's officers to see the work of train crews.

The following were not covered by the terms of reference: railway workshops, tugboat staff, dredger staff, staff employed on small passenger steamers, canal staff, commercial advertising staff, Railway Clearing House number-taking staff, ticket printing staff, or hostel staff.

The first progress report submitted in April, 1959, drew attention to the time taken to date by the investigation and suggested that work on the existing basis might occupy a further six months. After discussion, it was decided to reduce the programme and to recruit additional investigation officers.

With few exceptions, all investigations into railway work were completed during the week commencing September 7, 1959. The total number of reports amounted to 1,561, covering more than 150 grades. The number of reports for each grade was approximately proportional to the numbers employed in that grade.

Together with representatives of the Joint Advisory Committee, the Committee personally visited railway establishments on the Eastern, Southern, London Midland, and Western Regions on five days between August and December, 1959. Opportunities were taken to travel on the footplate and in guards' vans.

Although the committee could find no closely comparable work in Banking and Agriculture, two industries suggested for comparison with the railways by the Joint Advisory Committee, these industries were borne in mind when general conclusions were drawn.

The outside investigation was completed between April 27, 1959, and November 28, 1959. The total of reports submitted was 639.

Part II—Comparisons between Salaries and Wages in the Railways and in Outside Industries based solely on the Comparability of Jobs

Material was gathered from observation, interviews, and conversations with supervisors. A full description of main and subsidiary duties actually performed was obtained in each case, and information was sought on the following specific points:—

(i) whether the work was purely routine and repetitive and fully covered by instructions
(ii) what scope existed for initiative
(iii) whether the work involved supervision and if so, of how many and of what grades
(iv) to what extent the work was supervised
(v) extent of responsibility for efficient working of department, important decisions, equipment, money, materials, machinery, and confidential information
(vi) whether the work involved direct dealing with the public
(vii) degree of mental or manual effort
(viii) physical or nervous strain
(ix) extent of irregular hours, weekend work, shift work, night work, and work on public holidays
(x) training arrangements

Apparently comparable occupations which on close inspection showed only

superficial similarities were rejected.

It was correct to ignore small differences; there was general agreement as to what constituted a small difference.

Some railway occupations, such as those of signalmen and footplate staff, could not be exactly compared with work in outside industry. In general, the more senior the post, the less easy it was to discover similarities. An additional obstacle peculiar to the railways was its functional organisation, which limited the authority of many senior posts in comparison to that of supervisory or managerial posts in other industries.

Wide variations in versatility, intensity, or continuity of application in duties also constituted a bar to exact parallelism between jobs on the railways and in outside industry.

Ascertainment of Pay Comparability

Disagreement existed among the Commission and the railway trade unions as to whether an individual is more interested in the minimum rate of pay or in the average earnings of a job. The unions thought that the proper bases of comparison with outside industry were basic rates, though they agreed that full information was to be given concerning earnings. The Commission thought that the possible amount of "take-home pay" should be considered.

The committee decided to compare standard time rates of pay in the railways with those in other industries. Although full information on average earnings of each railway grade was available, this was not matched by similar information regarding other industries. The difference between rates and earnings was composed of disparate elements.

Extra payments at an enhanced rate obtainable on the railways for work done outside the normal daytime working week were intended as compensation for inconvenience caused by work at unusual hours. If the compensation balanced the inconvenience, the payments could be cancelled out and comparison of standard rates considered requisite. If they provided absolute gain over the above compensation for extra effort, where did compensation end and gain begin? For the purposes of its inquiry, the committee decided to disregard the payments except in consideration of different rates of overtime as an element in the relative advantages of employment in railway and other industries.

A second factor was payment by results: among railway employees not quite 42,000 (about 12 per cent) of all conciliation staff received such payments. This compared with the Ministry of Labour figure, published in October, 1957, of 31 per cent for workers paid by results in industry. As with overtime payment, it was difficult to make suitable allowance for payment by results.

Payment over the rate was common in industries where only minimum rates are prescribed and in industries in which negotiated rates are supposed to be standard rates. Merit rates and other personal payments were excluded. Otherwise, the nationally-agreed standard or minimum rates were used, except where jobs were examined in firms with individual agreements with trade unions, when the agreed rates were used.

Fewer employees were paid by results in the railways than in other industries and payment above the rate was rare. Any comparison of earnings, therefore, would be disparate.

Differences existed in standard weekly hours worked. Comparisons regarding salaried workers were made on the basis of their annual salaries and took into account the differences in their weekly hours.

Agreement could not be reached between the Commission and the railway trade unions on whether tips should be considered; in any event, these were impossible to calculate and appeared to affect only a very small minority of all railway employees. Nevertheless, the committee discovered that promotion was sometimes refused at large stations through unwillingness to lose income from gratuities.

Difficulty was met when comparing extra payments made for work in London to employees in the railways and in outside industries. On the limited evidence available, the committee concluded that the London rates for railwaymen were below those paid in many other industries.

All comparisons between rates were based on those paid on December 31, 1959.

In the case of salaried workers, comparisons were made, with few exceptions, in terms of the maximum. The difference between outside and railway pay was called the deviation from the railway rate. Percentage deviations from the railway rate were also given. The deviations ranged between 87 per cent plus (in favour of the outside industry) to 6 per cent below (in favour of the railways).

As variations were wide and numbers relatively small, it was thought that the arithmetic mean would be misleading as a general basis of comparison, and the median was adopted in most cases. The median is the rate which is half-way down a series of rates arranged in ascending or descending order. Where there was an even number of comparable rates, the median was defined as the normal arithmetic mean of the two rates on either side of the median.

Salaried Staff

It was found that the median outside salary of workers comparable with the Class 4 clerk was below the railway figure between the ages of 18 and 19 and only slightly above at the age of 20. From 21 to 28, the deviation varied between plus 9 and plus 13·6 per cent and became plus 13·7 per cent at the maximum of the scale.

Regarding Class 2 and Class 3 clerks, comparison was made at the maximum of the respective salary scales because higher clerical scales in the railways have only one increment and most clerks in those grades are on their maximum, and because the minimum of a higher scale must be governed by the maximum of the next lower scale in the work concerned. The median deviation showed railway disadvantages in Class 3 of 9·8 per cent and in Class 2 of 11·3 per cent.

The committee received the impression that the average clerical salary paid outside the railways is about 10 per cent above the railway figure.

Although insufficient outside comparisons were available in the case of the higher clerical, managerial, and supervisory grades to permit significant comparison to be made, the committee became satisfied that the average difference between railway and outside salaries was of the order of 10 per cent. This conclusion was more firmly established for clerks than for managerial and supervisory staffs.

Investigations were taken up to and including salaried staff in grades Special Class B.

The median percentage deviation for juvenile clerical work was 19·8 per cent above the railway rate at 16, and 22·7 per cent above at 17. Thus, these and Class 4 clerks must be considered separately from the other clerical grades covered by the investigation.

The committee had no reason to suppose that its general conclusions would not apply also to female salaried staff.

Conciliation Grades

Comparisons had been made between outside work and that of all minimum-rated adult manual grades in the railways. The median deviation of the rates paid for 18 comparable industrial jobs was plus 10·2 per cent in favour of outside industry. The basic railway rate had also been compared with the 12 labourers' rates which were commonly used in comparisons in collective bargaining. This comparison produced a median deviation of 8·9 per cent against the basic railway rate.

From these findings, the committee concluded that the average difference between railway pay and pay in other industries was of the same order for the basic manual grades as it was for salaried staffs.

Insufficient grounds for comparison precluded the use of the median in relation to any individual grade, but a figure favourable to industry of 11·3 per cent was found for jobs judged comparable to that of one or other of the conciliation grades.

An appendix showed a comparison of pay for railway grades above the basic against that received in outside industry. Rates were grouped according to the corresponding railway rate. The figures in the table appeared to bear out the committee's impression of the existence of a general 10 per cent disparity between railway wages and those of outside industry. Remuneration for comparable jobs covered a wide range.

An appendix showed rates paid to juvenile male workers in outside industries and suggested that railway rates were unfavourable to extents of between 45 to 80 per cent, according to age.

The conclusions concerning conciliation grades appeared also to apply generally to female manual workers on the railways.

While the median was not necessarily a certain guide, the committee had been assured by the general consistency of its findings that the figure of a 10 per cent disparity in wages was an indication of

the order of magnitude it was seeking.

Part III—Conditions of Employment and other Factors affecting the General Relativity of Pay in the Railways and in Outside Industries

An appendix sets out details of weekly hours of duty of salaried staff and of rates for hours not covered by the normal working week relating to the railways and other industries. The normal working week of 42 hr. for railway salaried staff was longer than that worked in comparable jobs in other industries.

The position regarding extra payments was complicated. Saturday or Sunday work was exceptional in some industries investigated. Where provisions were made for such payment, they seemed roughly to approximate those of the railways. Railway operation necessitated a certain amount of weekend work. While the additional pay from this work would augment average earnings of the staff concerned, shift work was unattractive and affected recruitment of salaried staff.

Annual leave of railway salaried staff either approximated or, especially in the higher grades, fell below that of the majority of other industries listed. The duration of sick leave on full or half pay in outside industry was appreciably greater than that granted in the railways.

The details of superannuation were complicated and were set out in an appendix. Railway superannuation differed considerably from that of all other industries; in some cases it was favourable, in others adverse. On no assumption could it be regarded as the most generous.

Outside industries required junior recruits either to pass an examination or to possess a specified number of passes in the General Certificate of Education. Specified passes in the General Certificate of Education constituted exemption from the entrance examination for railway clerical grades. The standard of this appeared to be well below those of most outside industries.

A study of a statement of promotion prospects of railway salaried staff, supplied by the Joint Advisory Committee, showed a considerable movement of salaried staff, involving promotion and increased remuneration. Nevertheless, the prospects offered to salaried staff did not appear to be better than those offered generally outside the railways, if indeed they came up to that level.

Travel Facilities

Travel facilities were dealt with in respect of both salaried and of conciliation staff.

An appendix showed that the following facilities were provided:—

(i) From five to seven free tickets a year, available in the Region of employment, were given to salaried staff according to category and class. Either one or two of these free tickets were available over any part of British Railways. Conciliation staff could receive from three to six free tickets annually, according to length of service, of which either one or two were available over any part of British Railways. This free travel covered wives and dependent children.

A similar entitlement on a reduced scale, dependent on length of service, applied to retired staff and to widows of men who had served on the railways.

Additional free tickets were also granted for special purposes.

Informal arrangements were made on a reciprocal basis with many foreign railway systems under which active staff of British Railways and their families enjoyed free or cheap travel abroad.

The second category included privilege tickets, given after one month's service, at slightly more than one quarter of the ordinary public fare on British Railways, and at specially reduced rates on London Transport trains. These privilege tickets were unlimited in number and granted to both active and retired staff, and to wives and dependent children. Privilege season tickets on British Railways and London Transport trains, at one quarter the standard public season ticket rate, were granted to all staff and to wives and dependent children.

Residential Travel

Free passes were available on British Railways between home station and place of employment, without any qualifying service, up to a distance of 12 miles for all active staff employed in London (10 miles radius from Charing Cross), and up to eight miles for active staff in the provinces. For residential journeys exceeding the free mileage limit, privilege tickets were issued for "throughout" journeys on British Railways. Allowance was made for the free mileage, and one quarter of the public season ticket rate was charged for excess.

The provisions in respect of privilege tickets and residential travel applied both to salaried and conciliation staff.

No reliable estimate could be obtained on the cost to the Commission of these travel facilities, for their use depended on individual circumstances. Nevertheless, it was pointed out that the revenue accruing to the Commission from privilege ticket fares in respect of all British Railways staff, including workshop staff (manual as well as clerical) during 1959 was approximately £900,000. This represented travel at fares available to the public amounting to approximately £2¼ million annually, after taking into account that privilege ticket fares are based on full standard fares, whereas tickets at reduced fares are available to the public under certain conditions.

According to evidence placed before the Railway Staff National Tribunal in October, 1952, approximately one-third of the total staff (manual and clerical) used the travelling facilities.

It was probable that most of these employees resided in London and other large industrial areas, in many of which present competition for labour is acute. In some cases, travel facilities would have been a material factor in attracting and retaining labour.

Every increase in railway fares increased the value of these special travel facilities. They were without parallel in outside industry, unless consideration were given to the concessionary coal of the coal miner. While not denying their value, the railway unions had refused to accept it as a justification for disparate wages.

The entitlement of the salaried grades was more generous than that of the conciliation grades and it seemed that salaried staff made more use of the facilities than did the conciliation grades.

Overall, the committee was of the opinion that the travel facilities represented a substantial advantage to railwaymen and to their families.

Security of tenure for salaried staff on the railways did not appear to be significantly greater than it was in similar outside employment.

Conciliation Grades

On balance, overtime for conciliation grades appeared to be paid at lower rates on the railways than it was in outside industry. The arrangements for weekend and night work did not seem to compare unfavourably with those of comparable industries outside the railways.

Annual leave and public holidays on the railways were in step with the great majority of the other industries.

Railway provisions for sick leave were better than those made by some other industries, and inferior to others.

Wide variety made difficult the comparison of superannuation benefits available to manual workers in various industries. Benefits in the railways appeared to be reasonably in line with those obtainable in other industries.

Career and Promotion Prospects

In respect of its career structure and promotion prospects for conciliation staff, British Railways was unique among British industries. An appendix showed that, from a total staff in the conciliation grades of some 350,000, more than 48,000 were in the lowest or basic grades, but there was much vertical movement.

On entering railway service in the lowest grade, the recruit was often faced with a wide variety of jobs if he had the capacity and ambition to seek promotion. In the case of footplate staff, there was the automatic "line of promotion" from cleaner through fireman to engine driver.

Although modernisation was likely to increase the attractiveness of railway employment, it would also affect adversely the promotion prospects of some present railway employees. These would cease to be a factor when modernisation was complete. In the near future, retirements on age grounds in the footplate staff would be much higher than normal with resultant improved prospects for lower grades.

The committee doubted whether any industry offered such a wide range of opportunity to a recruit in the wage-earning grades as did British Railways.

The uniforms or protective clothing provided for a number of grades was not considered as affecting the relativity of present railway pay.

The high level of national employment had detracted from the importance of security of tenure on the railways, and

superficial similarities were rejected.

It was correct to ignore small differences; there was general agreement as to what constituted a small difference.

Some railway occupations, such as those of signalmen and footplate staff, could not be exactly compared with work in outside industry. In general, the more senior the post, the less easy it was to discover similarities. An additional obstacle peculiar to the railways was its functional organisation, which limited the authority of many senior posts in comparison to that of supervisory or managerial posts in other industries.

Wide variations in versatility, intensity, or continuity of application in duties also constituted a bar to exact parallelism between jobs on the railways and in outside industry.

Ascertainment of Pay Comparability

Disagreement existed among the Commission and the railway trade unions as to whether an individual is more interested in the minimum rate of pay or in the average earnings of a job. The unions thought that the proper bases of comparison with outside industry were basic rates, though they agreed that full information was to be given concerning earnings. The Commission thought that the possible amount of "take-home pay" should be considered.

The committee decided to compare standard time rates of pay in the railways with those in other industries. Although full information on average earnings of each railway grade was available, this was not matched by similar information regarding other industries. The difference between rates and earnings was composed of disparate elements.

Extra payments at an enhanced rate obtainable on the railways for work done outside the normal daytime working week were intended as compensation for inconvenience caused by work at unusual hours. If the compensation balanced the inconvenience, the payments could be cancelled out and comparison of standard rates considered requisite. If they provided absolute gain over the above compensation for extra effort, where did compensation end and gain begin? For the purposes of its inquiry, the committee decided to disregard the payments except in consideration of different rates of overtime as an element in the relative advantages of employment in railway and other industries.

A second factor was payment by results: among railway employees not quite 42,000 (about 12 per cent) of all conciliation staff received such payments. This compared with the Ministry of Labour figure, published in October, 1957, of 31 per cent for workers paid by results in industry. As with overtime payment, it was difficult to make suitable allowance for payment by results.

Payment over the rate was common in industries where only minimum rates are prescribed and in industries in which negotiated rates are supposed to be standard rates. Merit rates and other personal payments were excluded. Otherwise, the nationally-agreed standard or minimum rates were used, except where jobs were examined in firms with individual agreements with trade unions, when the agreed rates were used.

Fewer employees were paid by results in the railways than in other industries and payment above the rate was rare. Any comparison of earnings, therefore, would be disparate.

Differences existed in standard weekly hours worked. Comparisons regarding salaried workers were made on the basis of their annual salaries and took into account the differences in their weekly hours.

Agreement could not be reached between the Commission and the railway trade unions on whether tips should be considered; in any event, these were impossible to calculate and appeared to affect only a very small minority of all railway employees. Nevertheless, the committee discovered that promotion was sometimes refused at large stations through unwillingness to lose income from gratuities.

Difficulty was met when comparing extra payments made for work in London to employees in the railways and in outside industries. On the limited evidence available, the committee concluded that the London rates for railwaymen were below those paid in many other industries.

All comparisons between rates were based on those paid on December 31, 1959.

In the case of salaried workers, comparisons were made, with few exceptions, in terms of the maximum. The difference between outside and railway pay was called the deviation from the railway rate. Percentage deviations from the railway rate were also given. The deviations ranged between 87 per cent plus (in favour of the outside industry) to 6 per cent below (in favour of the railways).

As variations were wide and numbers relatively small, it was thought that the arithmetic mean would be misleading as a general basis of comparison, and the median was adopted in most cases. The median is the rate which is half-way down a series of rates arranged in ascending or descending order. Where there was an even number of comparable rates, the median was defined as the normal arithmetic mean of the two rates on either side of the median.

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The committee doubted whether any industry offered such a wide range of opportunity to a recruit in the wage-earning grades as did British Railways.

The uniforms or protective clothing provided for a number of grades was not considered as affecting the relativity of present railway pay.

The high level of national employment had detracted from the importance of security of tenure on the railways, and

modernisation was making the future structure of the railways uncertain.

Much of the weekend and night work necessitated by railway operation was paralleled in industry and was compensated by higher rates of pay. Railway employees thus received some compensation for shift working, though possibly not so much as workers in most of those industries with special shift rates.

In comparing work, responsibilities, and wages structures of the railways and other industries, four points had been taken into consideration. These were that each industry had developed its own closely-integrated wage structure; there was a wide range of rates for jobs comparable to jobs on the railways; the railways were unique in structure and mode of operation; a single labour market caused wage differences as a whole to influence the supply of labour throughout the country.

The use of the median brought the committee to an initial figure of approximately 10 per cent in respect of conciliation and salaried grades within its terms of reference, the percentage representing in each case the adverse degree of the railway rate.

The balance between the advantages and disadvantages of the railway pay structure reacted on the labour supply. The advantages given to salaried railwaymen by their travel facilities were thought to be offset by the less favourable conditions of their employment.

In the case of the conciliation grades, the committee was of the opinion that, taking travel facilities and all other features of their employment into account, the balance rested on the side of the advantages. Because of this, a general increase of approximately 8 per cent was recommended for these grades.

Part IV—Wage and Salary Structure and Differentials

The railway wage and salary structure and differentials had been examined.

Any uniform increase applied to the conciliation grades would leave grave anomalies uncorrected: differences that amounted to less than 1 per cent of the total amount in the pay packet were indefensible.

The committee suggested a new scale of rates for the conciliation grades, with appreciably larger steps between one rate and the next. The present railway basic —156s.—could be augmented by a percentage increase which, added to an existing top rate, could be further augmented by an agreed differential.

Thus, if the general conciliation increase were 8 per cent, the basic grade in the new scale would be 168s. (ignoring fractions of a shilling). Similarly, a differential of 5 per cent would produce a new rate of 260s., taking the present rate of 229s., adding 8 per cent to make it 247s., and then 5 per cent differential.

The committee recommended that the existing number of railway grades (which was in excess of 150) be reduced to 12. Differentials should not be much less than 3 per cent.

Pin-pointing jobs apparently undervalued in relation to the general run of railway work was complicated by the difficulty of establishing exact comparisons. Grades therefore had been divided into those which the committee considered " out of line," for which a differential of 5 per cent was recommended, and those which were " badly out of line," for which a differential of 10 per cent was recommended.

Lengthmen and re-layers were considered to be "out of line": it followed that sub-gangers, gangers, re-laying gangers, patrolmen, and chainmen were also "out of line." Shunters, head shunters and guards were also " out of line."

The grading system for signals and telecommunications staff appeared to be unnecessarily complicated and might usefully be simplified. Basing the report on nearest equivalents, it appeared that this section was more underpaid than most other sections of railway staff. Apart from labourers, the pay of all signals and telecommunications staff seemed to be " out of line," and that for those required to have considerable technical knowledge, or to undertake heavy responsibility, it was " badly out of line."

Drivers and Motormen

The work of the steam driver undoubtedly was more arduous than that of other drivers, and his working conditions were the worst.

The personal life of the driver or motorman suffered unusual interruptions because of his hours of duty.

The committee recommended that the work of drivers be separated into three types: shunting, and short- and long-distance driving. There was a greater degree of responsibility for the train driver than for the driver engaged in shunting. Some 30 per cent of all drivers was employed on shunting operations. Some financial adjustment might be made when drivers reverted from train driving to shunting duties.

The committee thought that shunting drivers were not " out of line " with other railway workers, but that train drivers were " out of line."

For the purposes of the calculation, it was suggested that the rates of all conciliation grades be raised by the amount of whatever general increase is agreed for conciliation staff.

All " out of line " groups might then receive a further 5 per cent.

All " badly out of line " groups might receive a further 10 per cent beyond the general increase, i.e., 18 per cent in all.

A provisional set of grades could be set up with rates ranging from the lowest to the highest of the recalculated rates.

Each existing grade could be grouped under the new grade whose rate came nearest to its recalculated rate.

This grouping might result in slightly greater gain for some members of the conciliation grades than for others. It was because of this, that grade reconstruction could only be carried out in conjunction with a general increase.

All " badly out of line " categories should get an appreciably larger proportional increase than " out of line " groups. These should get proportionately more than those in the remaining grades.

If these views were accepted, the senior grade of signalmen, the senior grade of chief linemen, and the third-year motormen engaged on train driving should all come out in the top grade of the new scale.

Salaried Staff

A considerable proportion of the railway clerical staff was at the maximum of the Class 4 scale, the committee's references to which have already been summarised.

The average difference of 10 per cent between railway clerical salaries and salaries in comparable occupations in outside industry applied also to Classes 2 and 3, and might also to higher classes. A reorganisation of clerical staff at present in Classes 1, 2 and 3 would allow each new grade to have two increments.

The work of the different grades was not always clearly differentiated. There were considerable similarities and overlapping between Classes 1, 2, and 3.

Salaried staff might be divided into four groups: those who supervised the work of the manual grades considered to be " out of line " and therefore who were presumably also " out of line "; staff in the clerical grades to which attention already has been drawn; stationmasters; other groups of managerial and supervisory staff whose responsibilities might not be adequately recognised.

A differential of between 5 and 10 per cent for stationmasters in Special Classes "A" and " B " above any general increase was thought necessary.

London Rates

Even taking into account the cheap and free travel facilities granted to all railwaymen, it would appear that London differentials for both salaried staff and wage earners on the railways were too low.

The committee could not understand why footplate staff received a London rent allowance the amount of which was the same as the allowance given to other conciliation staff and which was not included in the calculation of overtime and other premium payments. It also could see no reason why London allowance was not paid to salaried staff in Special Class " A " and " B " in common with other salaried staff.

Part V—Other Matters

Three further comments were made on indirectly-connected points.

A separation of the salaried and conciliation staff for the purpose of negotiating terms and conditions of employment might provide better opportunities for discussion and resolution of problems; and improve railway industrial relations.

The investigating officers had drawn attention to the fact that, with the exception of a few outstanding examples, clerical accommodation, provision for meals, rest rooms, and sanitary facilities, were generally unsatisfactory and frequently inferior to standards prevailing in other industries.

Some clerical procedures seemed to be unnecessarily elaborate, and benefit might be obtained from an " Organisation and Methods " system.

Russian 3,000-h.p. Natural-gas Locomotive*

Opposed-piston two-stroke diesel engine converted for dual-fuel operation from bottled gas in tender

By E. N. Aseev and A. F. Shebrovsky

THE seven-year plan for the development of the resources of the U.S.S.R. envisages the increase of natural gas production from 30 x 10^9 cu. metres in 1958 to 150 x 10^9 cu. metres in 1965. This impressive increase of gas production permits wide use in industry and transport and in particular as a locomotive fuel. For the last-named purpose we are faced with the problem of evolving a locomotive operating on natural gas and capable of running for 500 km. and more without refuelling. The necessary gas supply can be accommodated in a gas bottle tender with 75 bottles each carrying 0·43 cu. metres at a pressure of 200 atm. abs. The general layout of the locomotive is shown in Fig. 1.

The main particulars of the locomotive, in comparison with those of locomotive TE4 supplied by a gas producer, are shown in the table below.

Locomotive	TE4	Natural Gas
Power output, b.h.p.	2,000	3,000
Weight in running order, tons ...	250	200
Maximum speed, km.p.h.	93	100
Specific weight kg./h.p.	125	66·6
Average consumption of liquid fuel per cent.	32	10
Radius of action, km.	400	500
Water consumption, gas generator, kg.	6,200	None
Overall length, mm.	36,270	27,970
Number of units	2	1
Number of driving axles ...	8	6
Axleload, tons	21·5	20
Crew	3	2

The main advantages of the gas-bottle locomotive are: its ability to adjust rapidly to the power requirements; simplicity of the power plant design and the convenience of operation and simplicity of maintenance; reduced axleload; reduced specific weight; and high economy. Also there is no need for a gas producer, auxiliary blowers, coarse and fine gas filters, gas coolers, and so on.

Two-Stage Pressure-Charging

With the new locomotive provision is made for charging the engine (Fig. 2) at 2·4 atm. abs. the charging being carried out in two stages. The first stage is accomplished by two independent turbochargers (1) which use the exhaust gas energy and compress the combustion air up to 2 atm. abs. while further increase to 2·4 atm. abs. is accomplished by the centrifugal blower (2). The high pressures can increase somewhat the mechanical and thermal stresses imposed on the engine. Because of this it will be desirable to keep the thermal stresses down by intercooling the air fed to the cylinders. Thus, in the duct (3) the air is cooled by about 5° C. while a further reduction up to 65° C. is carried out after the second stage with the aid of two coolers (4).

The use of two-stage charging permits the development of a 3,000 b.h.p. engine which, while having the same weight as engine 2D100, will be some 400 mm. shorter. The increase in height (by about 30 mm.) because of the air duct will be of no practical consequence.

The problem of gas supply and mixing with air is of particular importance so far as the development of the two-stroke engine is concerned. This is simplified by the high calorific value of the natural gas which, with 8,200 k.cal per cu. metre, drastically reduces its share in the gas-air mixture.

As known in the case of gas producers supplying gas with a low calorific value of only 1,200 k.cal. per cu. metre the gas/air ratio is approximately 1 to 1. This means that at each cycle half of the cylinder volume is claimed by the gas. To pass such large gas volumes requires mechanisms ensuring large passage areas which constitutes the main difficulty of a practical development.

Small Gas-Passage Area

The relation between natural gas and air in the engine cylinder, for a calorific value of 8,200 k.cal. per cu. metre and an excess air coefficient of about 1·6, will be approximately 1 to 8. This will permit the control of gas supply by a valve with a small passage area.

The maintenance of air swirl in the engine cylinder will facilitate a thorough intermixing of gas and air, this feature being characteristic of two-stroke engines with opposed pistons. Consequently it will be of advantage to commence with the supply of the natural gas during the compression stroke immediately following the closure of the ports by the pistons. The timing diagram is shown in Fig. 3, the phasing eliminating any loss of the natural gas and ensuring a thorough mixing.

The design of a single cylinder experimental engine OD100 for running on natural gas was evolved by the diesel design office of the V. A. Malishev

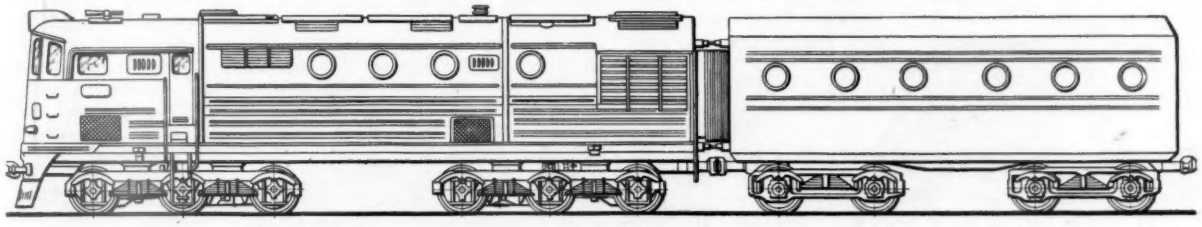


Fig. 1—Diagram of 3,000-h.p. locomotive with gas-bottle tender

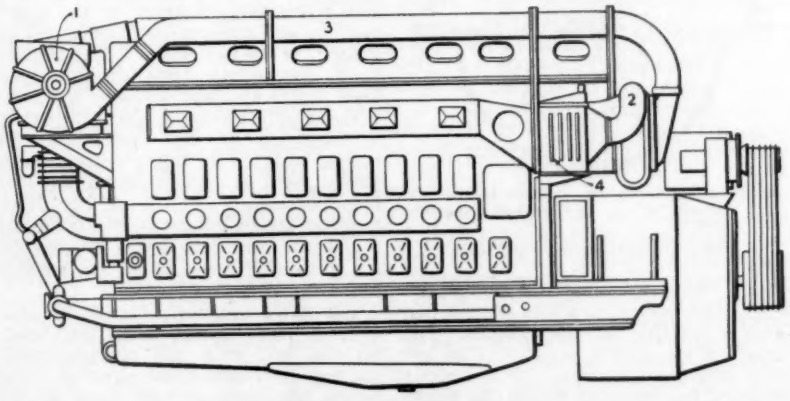


Fig. 2—Dual-fuel engine and generator, developing 3,000 h.p. when running on natural gas

*From: *Shelesnodorshni Transport*, December, 1959.

Factory at Kharkov in collaboration with the engine research laboratory of the Academy of Science of the U.S.S.R. The manufacture of the engine, Fig. 4 was completed towards the end of 1958, and it is now undergoing tests at the laboratory of the Academy. The single cylinder engine OD100 was designed for

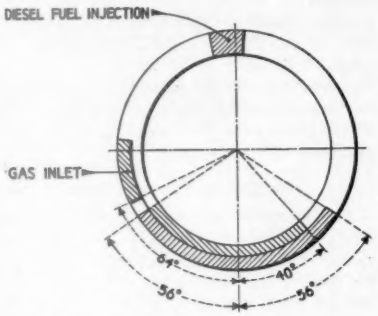
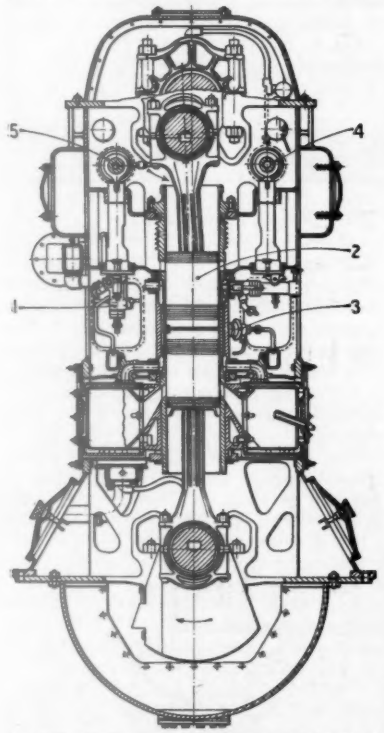


Fig. 3—Timing diagram of gas engine

operation on natural gas on a diesel-gas cycle. The fundamentals of this cycle consist in removing the diesel pumps from one side of all cylinders of engine 2D100 and installing gas valves in their



1 Fuel pump
2 Upper piston
3 Nozzle
4 Gas-valve camshaft
5 Fuel-pump camshaft

Fig. 4—Engine cross-section

places. The remaining fuel pumps are used to supply ignition fuel via the two nozzles provided at each cylinder. The supply of the natural gas is with the aid of a cam-operated valve. The amount of liquid fuel supplied by the fuel pump to facilitate ignition amounts to about 8–10 per cent of the total fuel supply. Conversion back to normal fuel is very simple consisting of cutting off the gas supply, one set of fuel pumps being sufficient to supply the fuel required to maintain the nominal power output.

Modifications to Diesel Engine

Modification of engine 2D100 for running on natural gas required the use of new assemblies. Thus the camshaft required to operate the gas admission valves needed special cams. To ensure optimum cam shape three designs were calculated and produced to ensure gas valve admission over 30, 45, and 60 deg. camshaft angle, the cam profile ensuring a valve lift within the limits of 2·5 to 5 mm. The valve-operating mechanism, Fig. 5, is of the lever type. The cinematic pattern of the operations is as follows: the roller is depressed by the cam (1) and transmits the motion to the plunger (2) and rod (3), The spring (4) presses the roller against the cam and deals with inertia forces of the moving parts. The lower end of the rod (3) presses against the hemispherical recess in the double lever (7) the other end of which transmits the force to the valve admission plunger. The housing (5) is a standard cast-iron production item. As this passes through the air distributor housing it must be hermetically sealed with the aid of rubber

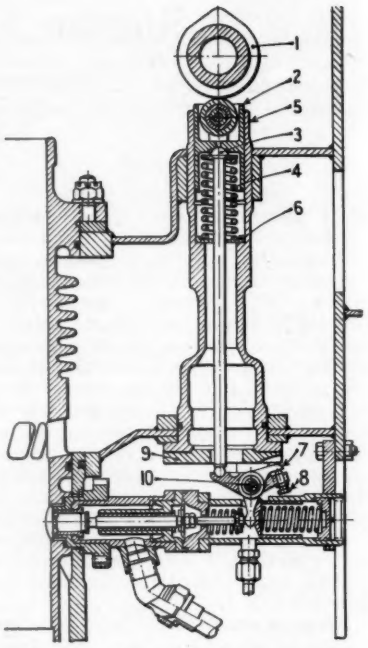


Fig. 5—Gas valve-operating gear

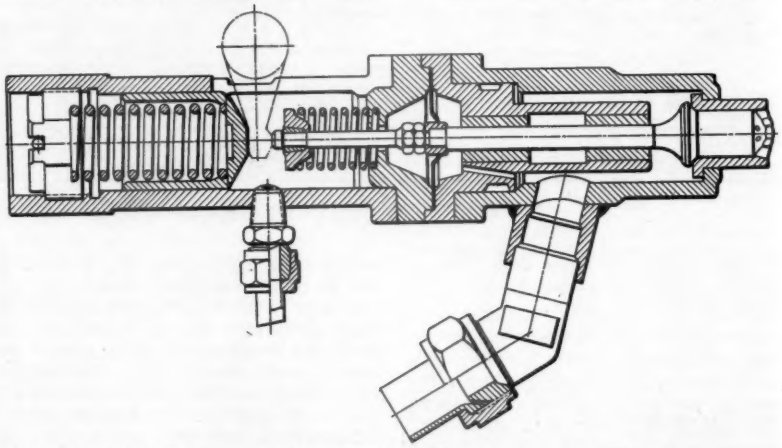


Fig. 6—The gas valve in section with nozzle to the right

gaskets. The operating rod (3) consists of a tube with a hemispherical upper end and a spherical extension at the lower end, the end surfaces being cemented to a depth of 0·6 to 0·9 mm. The plunger spring is required to deal with a maximum load of 210 kg., and the wire is 8 mm. in diameter. The lower end of the spring is supported by the washer (6). To permit variation of the admission valve stroke, the lever (7) is provided with two hemispherical recesses while the lever position can be adjusted with the aid of the screw (8). Both levers secured on the shaft (10) are located on brackets extending from the cover (9).

The valve assembly, Fig. 6, consists of two main components, the head, on the left, and the plunger housing, right. Weight characteristics of the engine are identical with those of the normal diesel engine, the main parameters of engine D55 and engine D100 running on natural gas being summarised in the accompanying table.

Engine	D55	D100
Cylinder bore, mm.	318	207
Stroke, mm....	330	2 x 254
No. of cylinders	6	10
Swept volume, litres	157·2	170·9
Pressure ratio	10·3	15·1
Max. output, eff. h.p.	1,000	3,000
Speed at max. output, r.p.m. ...	740	850
Mean effective pressure, kg. per sq. cm.	7·8	3·35
Spec. fuel cons. k.cal. per eff. h.p. ...	965	2,750
Pressure in air collector, kg. per sq. cm.	1·35	2·4
Minimum r.p.m.	380	390
Exhaust temp. at max. output, °C.	450	480
Max. pressure in cylinder, kg. per sq. cm.	59	90
Weight, incl. subframe, tons ...	17·5	19·5
Height, mm.	2,445	3,135
Length, mm.	500	6,220
Width, mm.	1,465	1,508

The second variation of this engine is destined for running on liquefied gas. With this it has been found that when burning the gasified fuel in the combustion chamber it is very difficult to ensure stable ignition under conditions of varying output requirements.

ELECTRIC RAILWAY TRACTION SECTION

Safety with High-Voltage Electrification

DESPITE the high voltage of the 50-cycle system of electrification now being installed on British Railways, the safety of the public and of railway staff will be in no way diminished. The greater insulation provided and the clearances and protection given to the live wires will enable adequate factors of safety to be retained.

The experience of the French National Railways affords evidence that the use of such high voltages brings with it little difficulty in the maintenance of safety. In some respects the a.c. system is safer than other overhead systems. The comparative freedom of the a.c. system from voltage surges renders failures of insulation less likely. In the event of faults, or accidents giving rise to short circuits, the extent of arcing and burning of insulation, and the risk of fire is minimised because of the low value of fault currents, and because of the ease of detection and clearance of faults by opening of circuit breakers at the sub-stations.

A technical demonstration recently staged by the British Transport Commission at Colchester St. Botolphs Station, British Railways, Eastern Region, before Ministry of Transport officials, trade union representatives, and railway officials conclusively proved the safety of the 25-kV. system.

For the demonstration a steam locomotive was positioned under the overhead line in the station platform. Over the front portion of the locomotive including the chimney and over the tender, loops of copper contact wire were hung from the main overhead cable. This avoided unnecessary burning of the main wire during tests and also reduced the distance the overhead wire had to be lowered to bring the gap to the point when flashover would occur. Throughout all the tests the locomotive was caused to emit as much smoke as possible with the blower on because under this condition, flashover is likely to occur over a greater distance than in clean dry air.

For the first test a man stood with one foot on a steel plate placed on the platform and the other on the locomotive. The steel plate was connected to the running rail by a wire to produce the same conditions as a man standing directly on the rail. During the test this man held on to the handrail of the locomotive. Others stood directly on the platform also holding the handrail and another man was on the footplate. The overhead line was energised at 25 kV. and the height of the contact wire was reduced to 11 in. above the chimney, then to five and finally 2 in. at which distance flashover occurred. All these men were perfectly safe because the current went direct to earth through the locomotive.

For the second test a dummy man, with the same electrical resistance as a real person, was placed astride the boiler of the locomotive facing the chimney, in a slumped, forward position. Again, the overhead line was energised at 25 kV. and the dummy was pulled up into a sitting position and it was not until his head was less than 1 in. away from the line that flashover occurred. Another demonstration was held with a dummy on top of the coal in the tender with similar results. Finally, high voltage surges were applied to the overhead line to obtain similar conditions to those encountered during a thunderstorm, while men stood in the cab and on the platform holding the locomotive handrail.

After the demonstration, Brigadier C. A. Langley, Chief Inspecting Officer of Railways, Ministry of Transport, stated that the demonstration had illustrated most effectively three important facts. First, the clearances between the contact wire and a structure, whether moving or fixed, as laid down by the B.T.C. and authorised by the Minister, provided an ample margin of safety. Secondly, there would be no danger to anyone legitimately on or in contact with a locomotive, if by any remote chance there was a flashover from the overhead wire even if there was a high-voltage surge such as might occur during an electrical storm. Thirdly, the results of failure to obey the safety rules had been vividly emphasised by the experiments on the two dummies.

Finally, Brigadier Langley made reference to some false impressions that may have arisen about the railway rule which prohibits certain classes of men from working within 9 ft. of an overhead wire unless power had been cut off. This had nothing to do with the distance across which an electric discharge could pass. It was a very wise and sensible precaution on the part of the railway administration to ensure that such men working near the overhead wires could not endanger themselves by inadvertently touching the wire with any long piece of equipment or tool which they might be using.

Train Working Through the Channel Tunnel

A TWIN-BORE double-track railway tunnel is reported to be recommended by the Channel Tunnel Study Group, whose report is to be studied by the several Government departments concerned in preparation for discussions with the President of the French Republic, General de Gaulle, on his visit to Britain next month. Much of the traffic would be motorcars and load road goods vehicles and containers on specially-constructed flat wagons. Objections to a road tunnel include its low traffic capacity compared with a railway; the difficulty of dealing with breakdowns of road vehicles; and ventilation. The railway would be electrified.

Operation through the tunnel would most likely be by the French National Railways, which would extend electrification from Amiens *via* Boulogne and perhaps also from Lille *via* Calais. These lines would be electrified at 25 kV., a.c., and no doubt extension is planned of that system through the tunnel. An interchange station between British Railways, Southern Region, and the S.N.C.F. is envisaged near the British portal. This would serve also as a loading and offloading point for traffic conveyed by road in Britain. The Southern Region lines in Kent are electrified, or are in process of electrification, at 750 V., third rail, with overhead collection at goods depots and sidings. To add, or to substitute, 25 kV. between the tunnel mouth and London would necessitate much work to obtain the necessary clearances through tunnels and under bridges. As it is, the restricted British loading gauge would necessitate construction of rolling stock of smaller than standard Continental dimensions to work over British Railways, to avoid costly enlargement. The possibility of extensive alterations to lines and stations and depots in Kent and South East London seems remote. Many new wagons would have to be built for conveyance of motorcars and for what is likely to prove an extensive " piggy-back " traffic between British and Continental stations, and the opportunity could be taken to build these to the British loading gauge. Electric locomotives would be changed at the interchange point near the British portal.

The commercial value of the tunnel would depend much on speed. A timing of 4 hr. has been suggested as feasible for passenger trains between London and Paris over a distance, varying according to the location of the tunnel, of some 260-270 miles. Including a stop to change locomotives, that would mean some very fast running, more particularly in France. A great deal of traffic would consist not only of overnight car/sleeper trains, but also of trains of motorcars with vehicles for the accompanying drivers and passengers on day journeys. These would have to run on fast timings to compete with air services. All goods services would require to be smartly timed.

The traffic capacity of the tunnel section would depend largely on the layout and siding space available at or near the portal, more particularly at the British end if the interchange station were built there. Speed through the tunnel would depend not only on the signalling and frequency of trains, but also on the steepness of the ascending grades for trains leaving the tunnel, though this is unlikely to be enough to restrict speeds more than is commercially desirable. The electric locomotives used by the S.N.C.F. on its system electrified at 25 kV. should be ample for working through the tunnel. In the Southern Region the 2,500-h.p. Bo-Bo locomotives equipped for third rail and overhead operation should be capable of working all trains between London and the interchange station.

Planning the Victoria Line, L.T.E.

Proposals for a new 11½-mile Underground line between Victoria and Walthamstow

THE County of London Plan in 1943 made suggestions for new surface and underground railways in London and in 1944 the Minister of Transport, in consultation with the Minister of Town & Country Planning, appointed the Railway (London) Plan Committee to investigate the technical and operational aspects of those suggestions made in the County of London Plan. In their first report, in 1946, the Committee dealt mainly with problems arising in connection with passenger transport. By then the British Transport Commission had entered upon its duties and the Minister agreed that it should review the proposals made by the Railway (London Plan) Committee. The Commission accordingly set up a Working Party to investigate in detail the proposals for rail passenger transport improvements in the light of the current economic and other developments. The Working Party published its report early in 1949 and made 18 principal proposals of which 11 were works recommended as first priority. Among these first priority recommendations was what was referred to as "Route C"—a new underground railway across central London from south-west to north-east to the Tottenham-Edmonton area.

With slight modifications the proposed new tube railway follows "Route C" with the south-western terminal at Victoria for the time being. It is now called the Victoria Line.

London Travel Committee Report

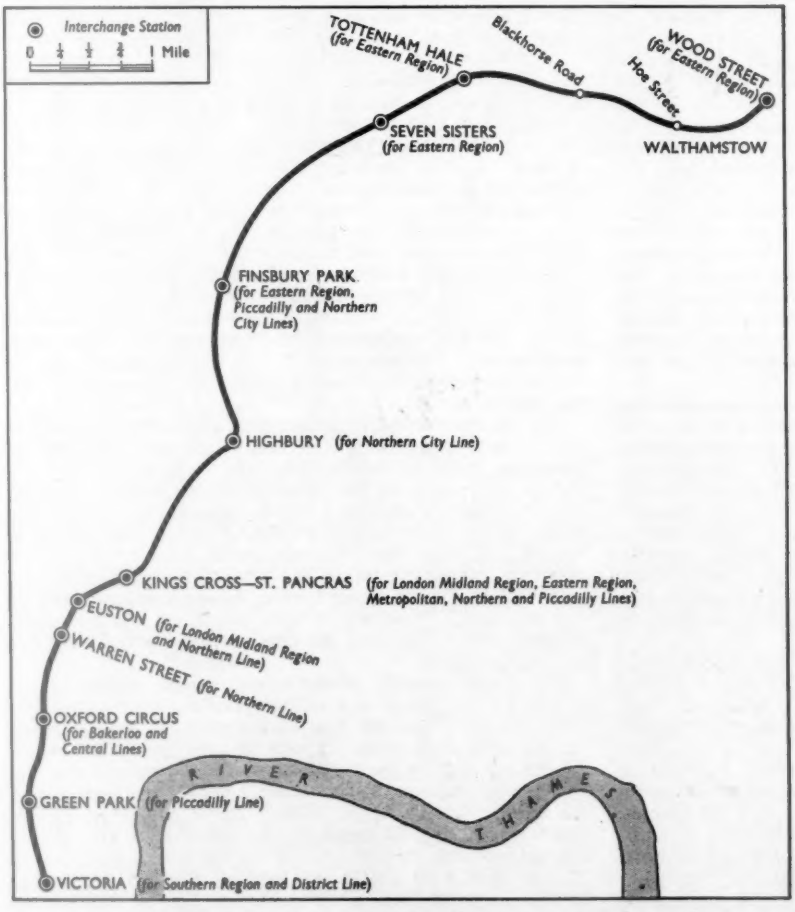
The London Travel Committee, in its report dated July 28, 1959, to the Minister of Transport, has once again drawn attention to the Victoria Line scheme. The Committee was asked by the Minister to recommend measures to further the object of relieving congestion on roads and on services to and from Central London provided by London Transport and British Railways. The Committee has recommended that the Victoria Line as it is at present planned should be authorised forthwith and construction put in hand as quickly as possible.

It will run from Victoria, generally in a north-easterly direction across central London, to Wood Street, Walthamstow. From Victoria it will pass close to Buckingham Palace on to Green Park Station, where it will cross over the Piccadilly Line at right angles and a low-level interchange subway will be built between the two stations.

The next station will be Oxford Circus, where the new tunnels will be at the same level as, and parallel to, the Bakerloo Line, so that there will be cross-platform interchange between the two lines; there will also be interchange subways with Central Line platforms.

The line will then go to Warren Street, with escalator interchange with the Charing Cross branch of the Northern Line, but just before reaching Warren Street the running tunnels will roll over; the northbound tunnel of the Victoria Line will go over to the other side of the southbound tunnel to provide reverse direction cross-platform interchange with the City Line at Euston.

The existing northbound City Line will be diverted to the south of the new Euston Station layout. To make the diversion it will be necessary to widen the existing northbound City Line tunnels, with consecutively larger diameter rings, to form what is known as step plate junctions. This will have to be done while the trains are still operating.


Interchange Station
0 ¼ ½ ¾ 1 Mile
TOTTENHAM HALE (for Eastern Region)
Blackhorse Road
WOOD STREET (for Eastern Region)
Hoe Street
SEVEN SISTERS (for Eastern Region)
WALTHAMSTOW
FINSBURY PARK (for Eastern Region, Piccadilly and Northern City Lines)
HIGHBURY (for Northern City Line)
KINGS CROSS—ST. PANCRAS (for London Midland Region, Eastern Region, Metropolitan, Northern and Piccadilly Lines)
EUSTON (for London Midland Region and Northern Line)
WARREN STREET (for Northern Line)
OXFORD CIRCUS (for Bakerloo and Central Lines)
RIVER THAMES
GREEN PARK (for Piccadilly Line)
VICTORIA (for Southern Region and District Line)

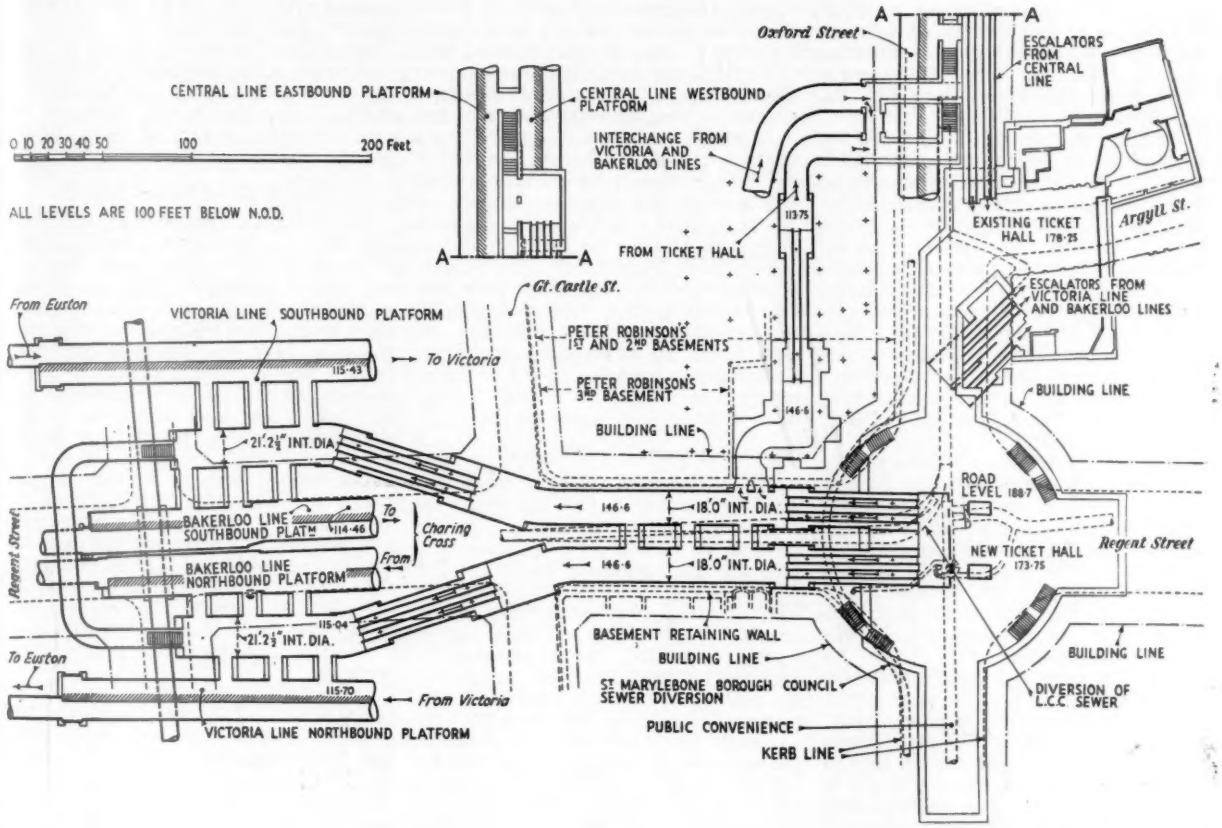
Proposed route of the Victoria Line, showing interchange facilities

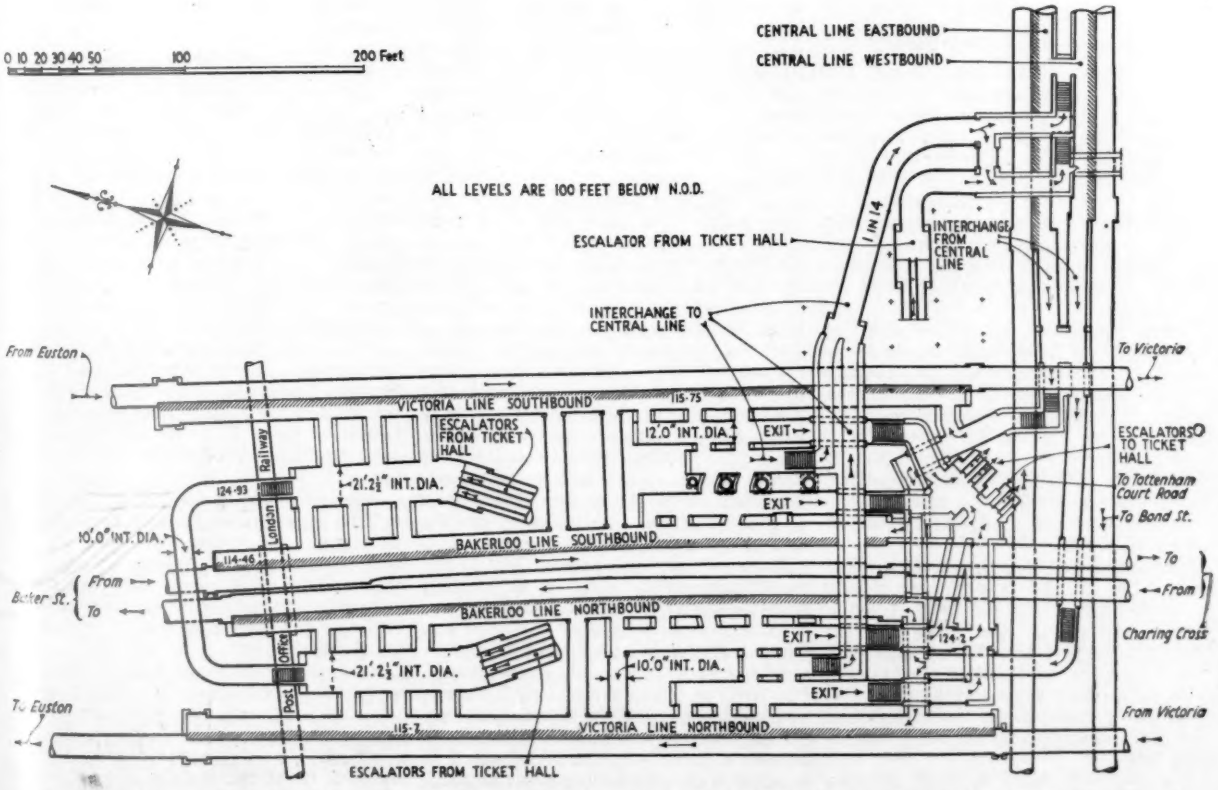
Reconstruction at Euston

The new lines will be running east and west at Euston. The northbound Victoria Line will have direct cross-platform interchange with the northbound City Line, although the Victoria Line trains will be travelling eastwards and the City Line trains westwards. The existing City Line station has an island platform which will be widened to form one platform for the southbound trains to provide direct cross-interchange with the southbound Victoria Line, both lines running in reverse directions east and west.

There will be a completely new top station with a ticket office under the concourse of Euston main line station. The top station is being designed to suit the possible future rebuilding of the London Midland Region station—designed in such a way to suit the present and the future layout of the terminus and also the various stages that will be necessary during the very considerable reconstruction of the terminus.

The next station will be Kings Cross. The Victoria Line will have interchange with the Piccadilly Line and the City Line, but it is not possible to provide ideal interchange facilities; there will, however, be easier cross-platform interchange at Highbury, the next station, and at Finsbury Park. The main feature of the new Kings Cross station will be to





Layout of new station at Oxford Circus, showing, above, plan at ticket hall level and escalators to platforms, and below, plan at platform level with interchange passages

gather up into one top station and ticket hall concourse the facilities for the three lines—the Victoria Line, Piccadilly Line and the Northern Line—and provide direct passenger interchange with the Eastern Region terminus.

At Highbury the plan is to divert the existing northbound Northern City Line tunnel to give cross-platform interchange with the northbound Victoria Line and to use the existing northbound Northern City Line station tunnel as the southbound Victoria Line station. The Northern City Line—the short line running from Moorgate to Finsbury Park—was originally built for Great Northern Railway suburban rolling stock. It is now to revert to its former use and will be converted for Eastern Region electrified suburban services using a 1,500-V. d.c. third-rail system.

At Finsbury Park the Northern City Line will be transferred to the Eastern Region high-level station. Cross-platform interchange with the Victoria Line will be arranged by diverting the westbound Piccadilly Line into the existing Northern City Line station tunnel, and for that purpose two more step plate tunnel junctions will have to be built under running conditions.

From Finsbury Park the Victoria Line will proceed to Seven Sisters, where three platforms will be built for reversing part of the service. There will also be interchange with the Eastern Region Enfield Line. At Seven Sisters there will be the connections to a new rolling stock depot on the surface at Northumberland Park.

Northumberland Park Depot

This depot, which will occupy 19½ acres, will have sidings for 24 trains in the open, a covered area which will provide for seven trains to stand over inspection pits and three trains in the lifting bays for running repairs and minor overhaul. Two washing machines will be built on the reception tracks to enable the trains to be washed automatically as they go out of service. A small permanent way maintenance depot will also be constructed.

From Seven Sisters the line will run through Tottenham Hale, where there will be interchange with the Eastern Region Cambridge Line, Blackhorse Road, Hoe Street, Walthamstow and terminate on the surface between the Eastern Region tracks at Wood Street. This station will have to be reconstructed to provide for the four tracks at the platforms, and there will be sidings for six trains.

The total route is just under 11½ miles, and of the 13 stations every one except two will have arrangements for passengers to change to other railways. It completes the pattern of the underground railway system of London. Although there have been extensions and reconstructions it would be the first completely new tube railway to be built in London since 1907.

The line will rise 130 ft. in the six miles from Victoria to Finsbury Park. After this it will fall 100 ft. to pass under the Lee Valley and then rise again to about the same level at Wood Street. It will be between 40 and 80 ft. below the surface. On the main running lines it would be desirable that the gradient should not be steeper than one in a hundred for lengths longer than a quarter of a mile; for lengths shorter than a quarter of a mile the gradient should not be steeper than 1 in 60. In sidings and stations the gradients should not be steeper than 1 in 350, but it has been impossible to plan for ideal conditions. For instance, it is necessary to cross over the Piccadilly Line at Green Park and the Central Line at Oxford Circus to provide platform interchange with the Bakerloo Line. At Kings Cross there is only one possible level for the new line, as it has to be threaded through a number of existing tunnels and sewers.

Elimination of Curves

When the tube railways were first built in London it was the policy to make them follow under roads where possible to reduce expenditure on the purchase of easements under private property. This caused unnecessarily long tunnels often with very sharp curves. Sharp curves not only require speed restrictions to be permanently imposed, but probably an increase in the diameter of the tunnel to provide clearance for the versine of the rolling stock on the curve. Sharp curves also cause heavy rail wear and extra maintenance work on rail fastenings. The effect of tunnelling under property has now been proved to be negligible, but the actual cost of tunnelling has greatly increased. It is now better to drive a tunnel as straight as possible between two points instead of following the route of the roads. There will, therefore, be no curves sharper than 20 ch. radius on the Victoria Line except at junctions.

It has been decided to use the London Transport standard tube type rolling stock, with improvements, on the Victoria Line. The trains will be of eight cars in two four-car units. The modern tube train has a passenger capacity of 10 per cent. less than a sub-surface or District Line train, but District Line trains would need running tunnels of 17-ft. dia., whereas the standard tube railway rolling stock requires 12-ft. dia. tunnels with the conventional cast iron lining. Because tunnelling costs vary approximately as the square of the diameter, a 17-ft. tunnel would cost nearly twice as much as a 12-ft. tunnel. Moreover, it would be impracticable to provide platform interchange with the other lines at Oxford Circus, Euston, and Finsbury Park and major alterations would have to be made to the existing tube lines and to the sub-surface City Widened Line at Kings Cross. The Fleet sewer would also have to be diverted there. The running tunnels will be driven in London blue clay for most of the route except from north of Warren Street Station to just south of Kings Cross where they will be in the Woolwich and Reading beds. Tunnelling in compressed air may be necessary over that section.

The existing tube railways in London are lined with bolted cast iron segments erected within the tail of the shield and cement grouted round the periphery. The method has stood the test of time and never failed, but London Transport engineers are studying new methods of tunnel lining which will probably be cheaper and quicker to erect where ground conditions are suitable.

New Types of Tunnel Lining

One of the new types of lining is flexible jointed cast iron without flanges or bolts. It is erected behind the shield and expanded by hydraulic jacks against the excavated ground and then wedged tight by cast-steel wedges. The diameter has to be 12 ft. 8 in. internally, because, being smooth inside, the segments are without the recesses of the conventional cast-iron lining into which the bulky equipment such as signal relay boxes are so conveniently fixed.

The internal diameter is slightly larger than absolutely necessary for the clearance round the loading gauge of the car; but the external diameter is the same as the driving shield required for conventional 12-ft. dia. lining, for it may be necessary to have lengths of conventional bolted tunnel lining where there are junctions, cross-passages and other openings.

The other new type of lining which is being considered is composed of solid concrete blocks which are also jacked against the ground—in this case at the top. The internal diameter has to be 12 ft. 6 in., which is determined by the necessary dynamic clearance between the rolling stock and the equipment in the tunnel.

Equipment for Tunnelling

The tunnels will be driven through the ground using rotary excavator shields which will be forced forward as the ground is excavated by powerful hydraulic rams reacting against the completed lining. As a length of tunnel is excavated, equivalent to the width of a segment of lining, the shield will be forced forward and a segment erected behind the shield with the use of a hydraulic erector arm. An improved type of shield called the drum digger shield will probably be used. This has been used recently on tunnelling for the Metropolitan Water Board. The speed of the cutters will be up to 4 r.p.m., and there will be 14 hydraulic rams 7 in. in dia. having a working pressure of about 200 lb. per sq. in.

The method to be adopted for the tunnelling of the route is that 23 working sites have been selected at which shafts will be first sunk. Wherever possible they will be made where they can subsequently be used permanently for ventilation or for cable shafts adjoining electrical substations.

In central London some of the squares or parts of the parks will be used temporarily as working sites, the area to be occupied being clear of the trees to avoid spoiling the appearance. From the bottom of the shaft a short tunnel will be driven at right angles to the route of the running tunnel and a shield chamber will be formed by hand mining. The

shield will then be erected and the driving of the running tunnel begun. Similarly at both ends of a station, shield chambers will have to be formed in which to erect the shields for driving the large station tunnels.

The planning of the stations and interchange passages, staircases, and escalators, has been based on the technique of designing the flow of passengers. London Transport has carried out operational research and a great deal of information has been collected from actual observations which has enabled the exits, entrances, subways, and interchanges to be designed with the correct sizes for the traffic. Observations have also been made to find the best speed at which to operate the escalators and it has been found that the maximum number of persons step on to an escalator when it is running at 145 ft. per min. The slope of the escalators will be 30 deg. to the horizontal. Where there will be a fluctuating traffic the escalators will be fitted with automatic speed control by light ray and sensitive cell.

Design of Stations

The civil engineering works at the larger interchange stations will be intricate and of very considerable magnitude. They will largely determine the overall programme for the construction of the line. Great care has been taken in designing the stations to provide the best layouts for the passenger capacity. As far as possible central concourses will be provided between the platforms at the lower escalator landings and at cross-platform interchanges adequate cross-passages will be arranged. One direction flows of entrance, exit, and interchange traffic are being designed.

At Victoria Station there will be heavy interchange with the Southern Region at peak periods. A new ticket hall will be built under the forecourt of the terminal and will be used for both the Victoria Line and District Line platforms. Escalators will connect the ticket hall with a lower landing concourse at Victoria Line level. From a separate lower concourse escalators will lead to an interchange subway connected to the District Line platforms with the object of separating the two passenger flows.

New Ticket Hall at Green Park

At Green Park station a lower concourse between the Victoria Line platforms will be connected by escalators to an enlargement of the existing ticket hall under Piccadilly. A separate low level interchange subway will join the Piccadilly and Victoria Line platforms.

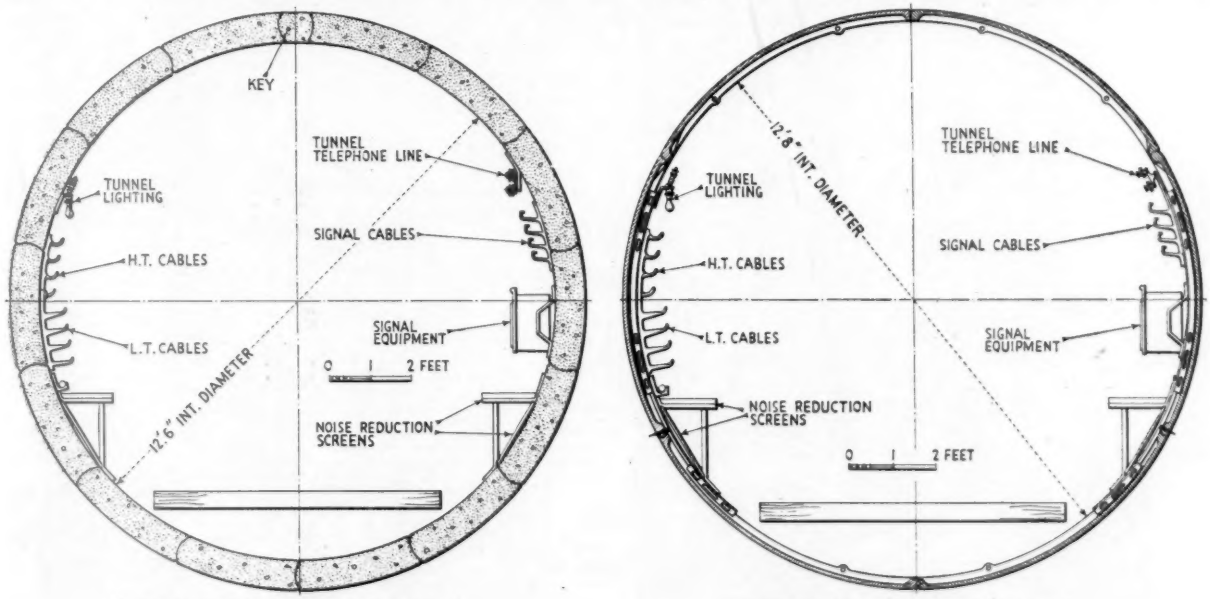
The engineering works to be carried out at Oxford Circus are formidable to provide a well-designed station for the Victoria, Bakerloo and Central Lines and interchanges between the three lines. A new ticket hall will be built under the Circus with staircases on each of the four corners. From the ticket hall there will be four escalators leading down to the platforms of the three lines. The existing escalators will be used for exit passengers so that the existing ticket hall on the corner of Argyle Street will be the main exit from the station and the new ticket hall will be the main entrance; a wide subway will connect the two halls. Direct cross-interchange between the Bakerloo and Victoria Lines will be provided and uni-direction flow interchanging between them and the Central Line will be by adequate size subways. Passengers leaving the Victoria and Bakerloo Line trains and changing to the Central Line will do so from the south end of the platforms, and passengers will be led to the north end of the platforms to join the trains. Thus cross traffic will be avoided and exit and entrance flows will be separated.

The works at Oxford Circus will be the most lengthy and probably the most difficult to be undertaken on the whole project. Not only will there be the numerous interlinked tunnels in the confined space but also very extensive diversions of sewers and statutory undertakers' equipment under the streets which are so heavily congested with road traffic.

The next station will be Warren Street. The existing ticket hall will be used. Two escalators are at present in use for the Northern Line and from the middle landing between them a new escalator will be provided to a platform concourse at Victoria Line level.

Apart from the diversion of the northbound tunnel of the City branch of the Northern Line at Euston which has already been mentioned in the description of the route, the new works will include an entirely new ticket hall under the main line terminal with new escalators serving the Victoria Line and Northern Line, City and Charing Cross branches. The escalators will connect the ticket hall with a system of subways at intermediate level, from which subways will lead to the City branch on one hand and two further escalators will connect with the parallel Victoria Line and City branch station tunnels on the other hand. A layout of subways under the main concourse of the London Midland Region station will join the suburban departure and arrival areas with the new Underground ticket hall. The existing entrance and lifts will become disused.

The works at Kings Cross will in-



PRECAST CONCRETE TUNNEL LINING — FLEXIBLE CAST IRON TUNNEL LINING

Cross sections, showing two new types of tunnel lining

clude the enlargement of the existing Piccadilly and Northern Line ticket hall and the provision of a new escalator to the Victoria Line platform concourse. The ticket hall will be partly circumscribed by a subway connecting the entrances, the Eastern Region station and the adjacent St. Pancras entrance, and will be connected to the Metropolitan Line. The anticipated passenger movements have been calculated and the flow lines designed.

Platform Interchange at Highbury

At Highbury, by diverting the northbound tunnel of the Northern City Line into a new station tunnel and using the existing tunnel for the new Victoria southbound line, straightforward cross-platform interchange will be provided. A new escalator will be installed to connect with a new ticket hall built adjacent to the London Midland Region Highbury & Islington Station and the existing station entrance with the lifts will become disused.

The works to be carried out at Finsbury Park Station are not so large as at other stations. The Northern City Line, having been transferred to the Eastern Region high level station, the existing Northern City Line platforms will be used for the southbound Victoria Line and the westbound Piccadilly Line. The existing Piccadilly Line platforms will be used for the northbound Victoria Line and the eastbound Piccadilly Line. Step plate tunnel junctions will, therefore, have to be built in the westbound Piccadilly Line north and south of the station to connect the existing northbound Northern City Line tunnel with the westbound Piccadilly Line tunnel. The two existing crossovers at the south of the station will be used to connect the Victoria Line with the Piccadilly Line to enable stock to be worked to Acton overhaul works, for transfer of stock and for engineers' trains. A lengthening of the existing westbound Piccadilly Line station tunnel (future northbound Victoria Line) will be carried out to provide for eight-car Victoria Line trains plus 15 ft. margin. The re-arrangement of the running tunnel will permit the cross-platform interchange facilities as at most other stations. No works at street level are contemplated at Finsbury Park Station.

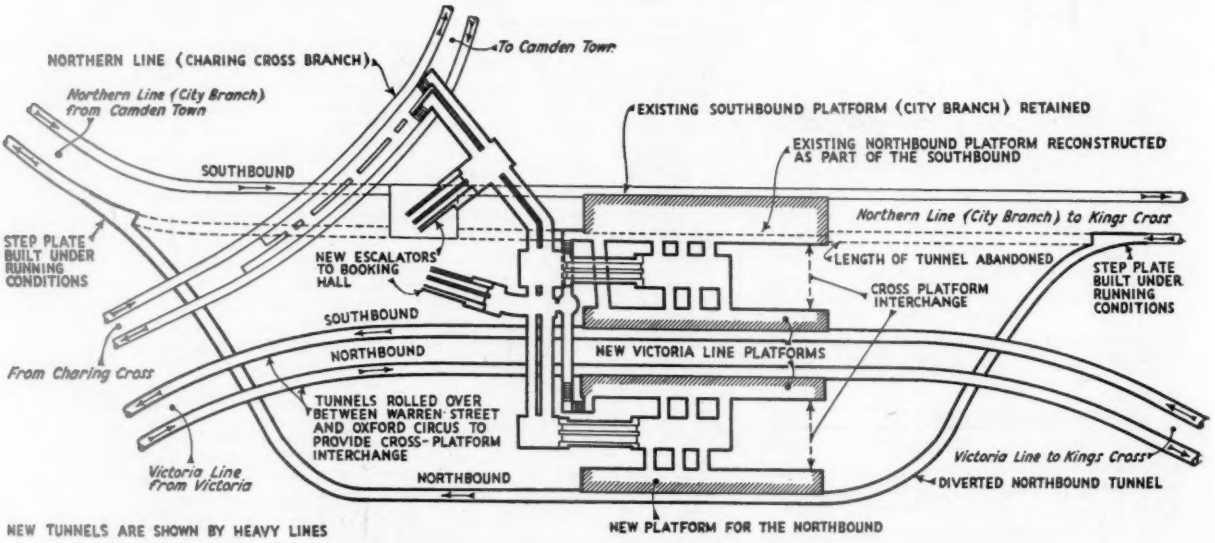
Seven Sisters Station will be double-ended and have three platforms. There will be a ticket hall under High Road, Tottenham, at the corner of Seven Sisters Road and escalators will connect to the lower platform concourse built between the northbound and the reversing platforms. From a middle landing a bridge passage will provide access to the southbound platform. There will be a similar layout at tube level at the south end of the station and escalators connecting to a surface ticket hall adjacent to the Eastern Region station on the Enfield and Palace Gates branches. North of the Victoria Line station two tunnels will rise between the running tunnels to provide inward and outward connections with the rolling stock running depot on the surface at Northumberland Park.

Tottenham (Hale), Blackhorse Road, and Walthamstow (Hoe Street) stations will be comparatively simple. There will be ticket halls at surface level and escalators connecting with platform concourses between the station tunnels. The ticket hall at Tottenham (Hale) will be built adjacent to the Eastern Region station down platform.

Section on Surface

The tunnels will rise to the surface approximately 1,000 ft. west of Wood Street, Walthamstow. The Eastern Region tracks will be separated, the Victoria Line tunnel portals will be built between them and the Underground tracks will rise to the same level as the Eastern Region at Wood Street where the underline bridge will be widened to carry the four tracks. The existing platforms at Wood Street Station will be widened to form two island platforms, giving direct interchange between the two lines. At the east end of the station four stabling and two service reversing sidings for the tube trains will be built between the up and down Eastern Region tracks.

The time for construction and equipment is estimated to be about five years. The major and most complicated civil engineering work will be concentrated at the interchange stations in Central London, particularly at Oxford Circus, Euston, and Kings Cross. The works at those stations will largely determine the overall programme. Tunnelling for the running lines will be carried out over a numbers of sections simultaneously. During the last 18 months architectural finishings, the equipment of the line, the equipment of the sub-stations, and the ventilation plant will be in progress. The installation of the track with long-welded rails, cable running, noise reduction screens, and the signalling will be carried out from north to south using, in the main, an equipment depot set up at Northumberland Park for the purpose.


NORTHERN LINE (CHARING CROSS BRANCH)
To Camden Town
Northern Line (City Branch) from Camden Town
EXISTING SOUTHBOUND PLATFORM (CITY BRANCH) RETAINED
EXISTING NORTHBOUND PLATFORM RECONSTRUCTED AS PART OF THE SOUTHBOUND
SOUTHBOUND
Northern Line (City Branch) to Kings Cross
STEP PLATE BUILT UNDER RUNNING CONDITIONS
NEW ESCALATORS TO BOOKING HALL
LENGTH OF TUNNEL ABANDONED
CROSS PLATFORM INTERCHANGE
STEP PLATE BUILT UNDER RUNNING CONDITIONS
SOUTHBOUND
NORTHBOUND
NEW VICTORIA LINE PLATFORMS
From Charing Cross
TUNNELS ROLLED OVER BETWEEN WARREN STREET AND OXFORD CIRCUS TO PROVIDE CROSS-PLATFORM INTERCHANGE
Victoria Line to Kings Cross
Victoria Line from Victoria
NORTHBOUND
DIVERTED NORTHBOUND TUNNEL
NEW TUNNELS ARE SHOWN BY HEAVY LINES
NEW PLATFORM FOR THE NORTHBOUND

Proposed layout at Euston Station, showing diverted Northbound Northern Line tunnel

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EXPRESS TRAIN IN COLLISION WITH PETROL LORRY IN U.S.A.—The "San Francisco Chief" express train of the Atchison, Topeka & Santa Fe Railway System, travelling from San Francisco to Chicago, struck a lorry carrying 8,000 gal. of fuel oil at a level crossing near Bakersfield, California on March 2. Nine of the train's 11 carriages left the rails and several of them were set on fire by oil sprayed from the blazing lorry. Ten passenger, three of the train crew, and the driver of the lorry were killed, and 45 others injured.

RAILWAY NEWS SECTION

PERSONAL

Sir Herbert Manzoni, Birmingham City Engineer & Surveyor, has been elected President of the Institution of Civil Engineers in succession to the late Mr. A. C. Hartley.

We regret to record the death on March 3, at the age of 59, of Mr. Leslie Edwards, M.B.E., Divisional Traffic Manager, Bristol, Western Region, British Railways. Mr. Edwards began his railway career at Box Station, Great Western Railway, in 1915. After serving at Bradford-on-Avon and Corsham Stations, he was transferred, in 1922, to the Divisional Superintendent's Office at Bristol, where he was engaged in all phases of office duties. In 1935 he moved to the Office of the Superintendent of the Line at Paddington, to supervise the Special Traffic Section. Four years later, he was appointed Chief Clerk to the Divisional Superintendent, Chester, and in 1941 was made Assistant to the Divisional Superintendent, Bristol. In 1946, Mr. Edwards again moved to Paddington, as Operating Assistant to the Superintendent of the Line. On January 1, 1950, he returned to Bristol, as Divisional Superintendent, an appointment later redesignated District Operating Superintendent. He was appointed Divisional Traffic Manager, Bristol, in October, 1958. Mr. Edwards was awarded the M.B.E. in the 1959 New Year Honours. In September last year he was appointed a Member of the Transport Users' Consultative Committee for the South Western Area. A few days before his death Mr. Edwards was admitted to the Order of St. John of Jerusalem in the grade of Serving Brother.

The late Mr. Leslie Edwards
Divisional Traffic Manager, Bristol, Western Region

Mr. E. W. Arkle, Director of Traffic Services, London Midland Region, British Railways, who, as recorded in our February 19 issue, has been appointed Chief Traffic Officer, British Railways Central Staff, at B.T.C. Headquarters, succeeds the late Mr. Frank Grundy. Mr. Arkle, who was educated at Marlborough and Exeter College, Oxford, joined the London & North Eastern Railway in 1923 as a Traffic Apprentice. He served in the Chief General Manager's Office at Kings Cross and in the Goods Manager's Office at York, and in 1929 was appointed Head of the Works & Docks Section, District Goods Manager's Office, Hull. He spent a year on the German State Railways studying all branches of work in various parts of the country. He then joined the Traffic & Statistical Section, Divisional General Manager's Office, York. In 1933 he was appointed Assistant District Goods Manager, Newcastle. In 1934 he became Assistant District Superintendent at Newcastle and in 1936 District Passenger Manager, Newcastle. Mr. Arkle was appointed Assistant Goods Manager, North Eastern Area in 1937, and in 1940 he also took over the duties of Assistant Passenger Manager in that area. He was made Assistant General Manager, Southern Area, L.N.E.R. in January 1943 and in June 1945 he became Goods Manager, Scottish Area, L.N.E.R. On nationalisation he was appointed Assistant Commercial Superintendent, Scottish Region, and in March 1949 was promoted to be Commercial Superintendent, North Eastern Region at York. In 1954 he moved to the London Midland Region as Commercial Superintendent in that Region. In May, 1957, a new traffic organisation was introduced in the London Midland Region, British Railways, and he was appointed Director of Traffic Services. Mr. Arkle is a member of the British Transport Commission Design Panel.

Mr. E. W. Arkle
Appointed Chief Traffic Officer, B.R. Central Staff

At the luncheon of the Institution of Locomotive Engineers, on March 4, Mr. R. A. Smeddle, President, announced that Mr. Derek C. Brown, Chief Mechanical Engineer, Crown Agents for Oversea Governments & Administrations would be President of the Institution for 1960-61, which will be the 50th jubilee of the Institution.

Mr. R. W. Paterson has been appointed Scottish Secretary, Transport Salaried Staff Association.

Dr. G. Charlesworth has been appointed Head of the newly established London Traffic Management Unit.

Mr. E. H. Childers, Minister for Transport & Power, Republic of Ireland, on the invitation of Mr. Gosten Skogland, Swedish Minister for Communication, recently paid an official visit to Sweden to study the railway system. He was accompanied by Dr. C. S. Andrews, Chairman of Coras Iompair Eireann.

Mr. B. A. Chengapa has been appointed Assistant Liaison Executive in India for Perkins Limited.

Mr. Henry Berry has been appointed Transport Controller, Dunlop Rubber Co. Ltd. This is a new appointment and Mr. Berry will assume responsibility for all the company's transport operations in the United Kingdom.

Mr. Y. P. Kulkarni, Additional Member (Staff), Railway Board, India, who, as recorded in our November 27 issue, has been appointed General Manager, North East Frontier Railway, India, was born in 1906. Mr. Kulkarni studied at the College of Engineering, Poona, and joined the former North Western Railway, as Assistant Executive Engineer, in 1929. In 1948 he was appointed Divisional Transportation Superintendent, Great Indian Peninsular Railway, and the same year joined the Railway Board as Joint Director (Adjudication). He was a representative of the Board on the Joint Advisory Committee on railway labour. In 1955 he became Joint Director (Establishment), Railway Board, and was made Director (Establishment) about fifteen months later. In this capacity, he was a member of the Indian Government Delegation which visited the U.K., France, Belgium, West Germany, Sweden, Yugoslavia and Switzerland to study workers' participation in management. In 1958 he took over as Additional Member (Staff), Railway Board, in which capacity he dealt with labour-management relations. He was in close contact with the National Federation of Indian Railwaymen, as the Railway Board's representative. He remained in this position until his recent appointment.

Mr. E. E. Sayers, District Manager, Canadian Pacific Railway, Belfast, has retired after 36 years of service. He is succeeded by J. I. Topping. The position will now be known as Manager for Ireland.

Following his visit to Egypt, as Leader of the British Trade Mission to the United Arab Republic, Mr. H. G. Nelson, Managing Director, English Electric Co. Ltd., visited Ethiopa, and is visiting the Sudan from March 7–12, in his capacity as Industrial Leader and Vice-Chairman of the Advisory Council on Middle East Trade. The object of the visits is to assess trade prospects with these countries and to make personal contacts with Ministers, Government officials, and members of business communities. Mr. Nelson is being accompanied throughout the tour by Mr. K. E. Mackenzie, Executive Secretary of the Advisory Council on Middle East Trade.

Mr. Andrew Garratt has been appointed Public Relations Manager, D. Napier & Son Ltd., in succession to Mr. C. G. Hollowell, who has become the Joint Deputy Publicity Manager (General), English Electric Co. Ltd.

Mr. J. H. Brebner, Public Relations Adviser, British Transport Commission, has accepted an invitation from the organisers of the first International Congress of Outdoor Advertising, to be held in Toronto, July 11–16, to be the principal speaker and co-ordinator of the Public Relations Session. Mr. Brebner is President of the British Public Service Vehicle Advertising Committee and Vice-President of British & Irish Railways Incorporated, whose offices in Toronto and New York he will visit during his stay.

Mr. F. V. Everard has been elected President of the Engineering & Allied Employers' National Federation.

Captain G. E. Coles has been appointed an Additional Director of the Barrow Haematite Steel Co. Ltd.

Mr. M. A. Hamid, Divisional Superintendent Multan, North Western Railway, Pakistan, who, as recorded in our November 20 issue, has been appointed Chief Commercial Manager, joined the Oudh & Tirhut Railway as Assistant Traffic Superintendent in 1933. He served as a District Traffic Superintendent from 1944, until he opted for service in Pakistan. He was for a time Superintendent, Walton Training School, and later became Divisional Transporation & Personnel Officer and Divisional Commercial Officer, North Western Railway. Mr. Hamid subsequently held office as Deputy Chief Commercial Manager, Deputy Chief Operating Superintendent, and Deputy General Manager (Efficiency), North Western Railway.

Mr. Wilfred Padley has been appointed to the board of Metal Industries Limited. He will relinquish his position as Managing Director of Brookhirst Igranic Limited, an electrical subsidiary of the company, and will be succeeded in that position by Mr. A. B. Vickery.

Mr. A. L. Dorling has been appointed to the board of Fisons (Pty.) Limited, of South Africa, an associated company of Fisons Limited. Among Mr. Dorling's responsibilities in his new position as Commercial Director will be the investigation and development of new projects.

Mr. Y. P. Kulkarni
Appointed General Manager, North East Frontier Railway, India

Mr. M. A. Hamid
Appointed Chief Commercial Manager, North Western Railway, Pakistan

Mr. J. Thorrington

Appointed Assistant to Commercial Officer, North Eastern Region

Mr. J. Thorrington, Market Research Investigator in the Line Traffic Manager's Office, Kings Cross, Eastern Region, British Railways, who, as recorded in our March 4 issue, has been appointed Assistant to the Commercial Officer, York, North Eastern Region, will devote himself exclusively to the expansion of carryings of solids in bulk. His duties will include study of special equipment for economical transfer between rail and road. Mr. Thorrington began his railway career in 1934 with the London & North Eastern Railway at Southend-on-Sea. During the 1939–45 war he served with the Royal Navy and attained the rank of Lieutenant R.N.V.R. After demobilisation he was attached to various stations in Essex and, eventually, to the staff of the London District Goods Manager. In 1956 he was appointed Commercial Goods & Parcels Representative, in the London Commercial Service, and later became Market Research Investigator in the Line Traffic Manager's Department at Kings Cross, the position he recently vacated. Editorial reference to the new appointment was made in our March 4 issue.

Dr. A. P. C. Cumming has been appointed Technical Director of the John Bull Rubber Co. Ltd.

Mr. S. P. Chambers has been elected Chairman of Imperial Chemical Industries Limited. He succeeds Sir Alexander Fleck, who retired on February 29.

Mr. Norman Readman has been appointed to the board of Chicago Pneumatic Tool Company of New York. He will continue as Managing Director of the London subsidiary, the Consolidated Pneumatic Tool Co. Ltd.

Mr. K. A. Fillmore, Home Sales Manager, British Insulated Callender's Cables Limited, has been appointed Divisional Sales Manager, Leigh Works. He succeeds Mr. D. I. S. Hinton, who is taking up an appointment with B.I.C.C.-Burndy Limited.

Sir Allan Eliott Lockhart, who until 1958 was Managing Director of Gladstone & Lyall Limited, East Indian Merchants, has been appointed Managing Director of the newly created Pipework Engineering Division, Stewarts and Lloyds Limited.

Mr. James H. Young, Acting District Commercial Manager, Dundee, Scottish Region, British Railways, has been appointed District Traffic Superintendent, Aberdeen.

Mr. H. M. Herbert, Assistant to the Chief Operating Superintendent, Scottish Region British Railways, has been appointed Traffic Manager, Northern Division, Scottish Region.

Mr. J. G. Norton, Assistant Regional Establishment & Staff Officer, Euston, London Midland Region, British Railways, has retired.

Mr. J. L. Mouat, Manager, Hongkong Office, Thomas Cook & Son Ltd., since 1954, has retired.

Mr. G. V. Harvey, Sales Director, Smiths Industrial Instrument Division, is making a two-month visit to South Africa and Rhodesia. Calls will be made in Kenya, Nigeria and Ghana.

Mr. J. E. Dewdney, Traffic Costing Officer, British Transport Commission, has been appointed Passenger Commercial Assistant, Line Traffic Manager's Office, South Eastern Division, Southern Region, British Railways. He succeeds Mr. J. K. Blue, who, as already recorded, has been appointed Passenger Assistant, Waterloo.

L.M.R. Appointments

London Midland Region, British Railways, announces the following appointments:

Mr. H. Wilkinson as Assistant (Wages Staff), Regional Establishment & Staff Office, Euston.

Mr. J. W. Caldwell as Chief Technical Assistant (Inspection), Chief Mechanical & Electrical Engineer's Department, Derby.

Mr. S. Grunberg as Assistant New Works Officer, Chief Civil Engineer's Department, Euston.

Mr. R. V. Hughes as Assistant New Works Officer, Chief Civil Engineer's Department, Manchester.

Mr. C. R. Stuart as Assistant District Goods Manager, Birmingham.

Mr. K. R. Brown, as Assistant Electric Traction Engineer, Rugby.

Mr. S. L. Eccles as Stationmaster, Blackburn.

E.A.R. & H. Appointments

Mr. J. H. Collier-Wright has been appointed Chief Commercial Superintendent, East African Railways & Harbours. Mr. C. I. Wotherspoon has been acting as Chief Commercial Superintendent since Mr. C. T. Hutson left the E.A.R. & H. to take up an advisory position with the Sudan Railways last June, and he will continue in this acting capacity until Mr. Collier-Wright returns from leave in May. Mr. Wotherspoon will then be promoted to an appointment in the General Manager's Office. Mr. R. L. Rolph, Assistant Chief Engineer (Administration), is to become Chief Establishment Officer, in the place of Mr. Collier-Wright. Mr. C. W. Leverett who has, for the last eight years, been Regional Representative of the E.A.R. & H. in Tanganyika, retires from railway service this month. Mr. B. H. Simmonds will succeed Mr. Leverett in Dar-es-Salaam, though he will not take up his duties until later this year. Mr. Simmonds, who has been Principal Assistant (Works & Finance) in the General Manager's Office since joining the E.A.R. & H. in 1955, has previously held the position of Regional Representative in an acting capacity when Mr. Leverett has been on overseas leave. Until Mr. Simmonds takes up his new duties, Mr. A. Towle will act as Regional Representative. Mr. Towle has been seven years in Tanganyika mainly in the capacity as District Mechanical Engineer.

Mr. S. B. Hobbs

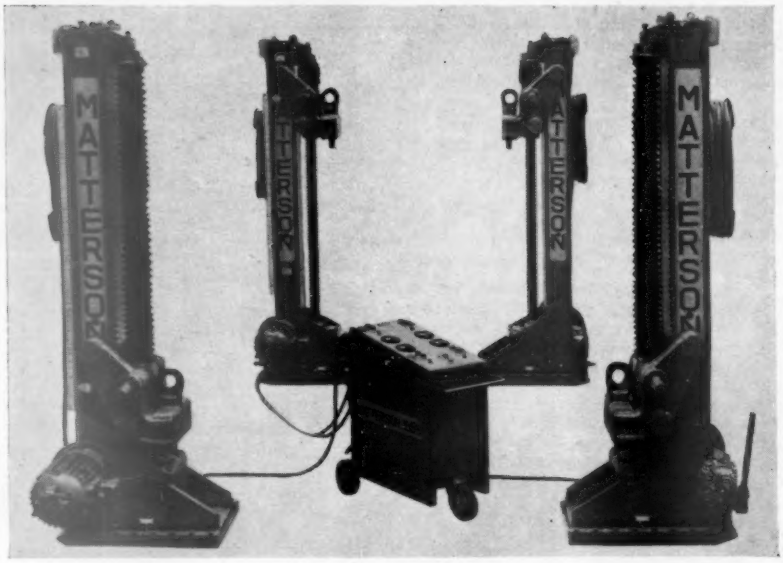
Appointed Assistant to Commercial Officer, North Eastern Region

Mr. S. B. Hobbs, who, as recorded in our March 4 issue, has been appointed Assistant to the Commercial Officer, York, North Eastern Region, British Railways, will specialise in transport of liquids in bulk. Mr. Hobbs joined the London Midland & Scottish Railway in 1937. He served at various points in the London area until the 1939–45 war, when he held a commission in the Middlesex Regiment and was demobilised after overseas service with the rank of Captain. After the war, Mr. Hobbs joined the London District sales organisation and for the past three years has held a Sales appointment with the London Commercial Service, having special responsibility for oils and chemicals. Editorial reference to the new appointment was made in our March 4 issue.

Mr. J. W. H. Nicholson has been appointed Advertising & Publicity Manager, F.A.G. Bearing Co. Ltd. Mr. E. B. Steer has been appointed Manager of the company's new Birmingham branch, and Mr. V. Sedgeley becomes Manager of the new Wolverhampton branch.

Mr. H. H. Robinson, M.B.E., M.C., T.D., Assistant General Manager (Negotiations), Thos. Cook & Son Ltd., has retired. Mr. Robinson, who is 65, joined the company in the Post Order Department in 1912. During the 1914-18 war he served in the H.A.C., and later held a commission in the Machine Gun Corps, in which he was awarded the M.C. He returned to the company in 1919 and after service in the Ocean Travel Department, Pall Mall, moved to Cairo, Kensington, Ludgate Circus, Colombo, Bombay and Baghdad, where he was Clerk-in-Charge in 1925. He became Chief Clerk, Cruise Department, Head Office in 1929. During the 1939-45 war he received the M.B.E. and attained the rank of Colonel in the Royal Engineers, Movement Control, and later became Deputy Director of Movement (Personnel), War Office. On his return to the company in 1947, he was appointed Assistant Negotiations Manager. He became Assistant General Manager (Negotiations) in 1954. He was a member of the Council of the Association of British Travel Agents, Chairman of the Institute of Travel Agents and executive member of the International Consultative Council of Travel Agents.

NEW EQUIPMENT AND PROCESSES



Locomotive Lifting Jack

EASE of control and synchronising of lifts make electrically-operated screw jacks particularly suitable for the lifting of diesel and electric locomotives. A range of this type has recently been introduced for lift capacities of 10, 16, 20 and 25 tons each. Lifting speeds vary between 8 in. and 12½ in. per min., and standard maximum lift heights are between 6 ft. and 8 ft. above base level. The 20-ton jack as supplied to British Railways is typical of the design and constructional features of the complete range.

The jack is designed for lifting and sustaining the load up to a bridge height of 7 ft. 1½ in. from floor level, from a minimum height of 2 ft. 3½ in. As the jacks are normally used in groups of 2, 3, or 4, control is arranged electrically from a portable console contactor box and control panel. Incoming mains are plugged into the console from a flexible trailing cable. Each jack is similarly connected to the console by a trailing cable with multi-pin plug to accommodate the main three-wire supply, earth proving, limit switch, and warning lamp circuits.

Separate contactors in the console serve each jack motor, and operation of the master switch simultaneously energises all contactors selected in the Up or Down directions as required. Lifting speeds are virtually similar irrespective of load, but a height scale is fitted to facilitate checking of heights during operation.

An approximate indication of load distribution on the jacks is obtained from the ammeters in each motor circuit. These also indicate potential overloads before the normal protective overload circuits operate.

The lifting mechanism is driven by a 3-h.p. squirrel cage electric motor. Driving through a worm and spur reduction gearbox, this rotates a vertical lifting screw, giving a lifting speed of 6 in. per min.

A square shaft extension is provided on the end of the worm-shaft for emergency manual operation. The bronze lifting nut is pivoted in the rise-and-fall bridge to eliminate any binding on the screw. The nut is fitted in two halves to facilitate inspection for wear, and the screw is protected from dust and moisture by a telescopic cover. A steel safety nut, unloaded, is positioned below the bronze nut. The thrust of the main screw is taken on a ball thrust bearing located below oil level in the gearbox.

The main structure of the jack comprises a fabricated steel base, which incorporates the gearbox and a box-section column bolted to the base. The base is fitted with bronze-faced slideways which engage with an auxiliary base. This gives 2-in. adjustment by means of a screw and nut, the screw being operated by a reversible ratchet lever. Reaction of the jack pad is taken on two pairs of steel rollers running on hardened strips on the inside and outside of the front face of the column. The bridge is arranged to accept any suitable lifting eye or anvil in a 2-in. dia. vertical hole.

Jacks can also be supplied with sliding instead of fixed arms to suit recessed jacking pad positions. On some models, the control panel for each pair of jacks is mounted on the column. Lifting eyebolts are fitted on all jacks, and a transporting trolley to assist jack positioning is available.

Further details may be obtained from the manufacturer, Matterson Limited, Rochdale.

Improved Trimming Knife

AN improved version of the Stanley trimming knife incorporates the following new features :—

A wider selection of blades, giving the knife greater versatility; a new, slightly heavier alloy handle, making the knife surer and steadier in the hand; a hole through the handle enabling the knife to be hung up and a new captive securing screw for the handle. Price is 6s. Replacement normal-duty blades are sold for 2s. per packet of five and heavy-duty and hooked blades for 2s. 6d. per packet of five. All blades are double-ended.

Further details can be obtained from the manufacturer, Stanley Works (G.B.) Limited, Rutland Road, Sheffield, 3.

Miniature Thermocouple Wire

ADDITIONS to the range of Philips "Thermocoax" (miniature thermocouple) wire include the 2BB Ac 10, which consists of two wires of alumel in a stainless steel sheath with an overall diameter of 1 mm., the 2AB Ac 15 and 2AB Ac 20, "Chromel-Alumel" wires in a stainless steel sheath with overall diameters of 1·5 mm. and 2·0 mm. respectively, and the 1 Nc I 05, a heating element of nichrome in an inconel sheath with an overall diameter of 0·5 mm. The 2BB Ac 10 can be used for measuring differential temperatures.

Further details can be obtained from the manufacturer's sole U.K. distributors, Research & Control Instruments Limited, Instrument House, 207, Kings Cross Road, London, W.C.1.

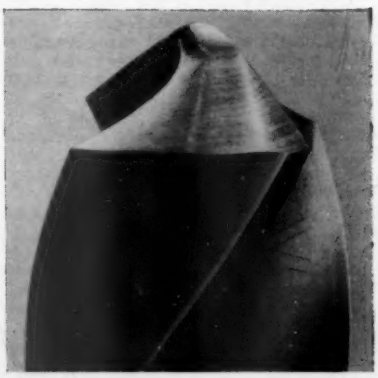
Drill-Sharpening Machine

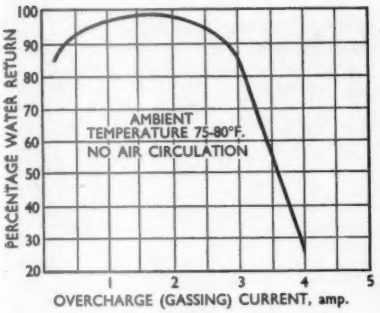
THE Cincinnati "Spiropoint" is a drill-sharpening machine which quickly and simply gives a spiral point to a standard twist drill. This is claimed to ensure accuracy in hole-positioning, eliminates centre-punching, produce holes closer to size, rounder, straighter and burr-free; increase drill life, reduce requirements for drill thrust force; reduce the need for secondary operations such as reaming, and produce less workpiece distortion.

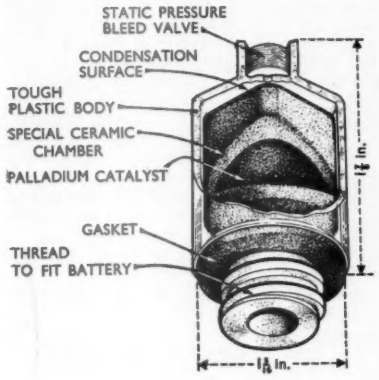
The drill automatically centres itself on contact with the work. There is no tendency to walk. As a result, spotting is eliminated and the need for jigs and fixtures greatly reduced. Improved cutting angles help to reduce heat generation and optimum clearance angles along the entire cutting edge enable chips to flow more easily into the flute—features which help to increase drill life.

The spiral point can be given to a drill in a few seconds on the drill sharpener, which is shipped as a complete unit, ready to run. All electrical equipment, tools, grinding wheels, and operating instructions are included as standard equipment.

Further details can be obtained from the British selling agents, Charles Churchill & Co. Ltd., Coventry Road, South Yardley, Birmingham.







Battery Maintenance Aid

CATYLATOR catalyst caps for batteries used in rail and road vehicles and for many other purposes, are designed to consume hydrogen given off during charging, to trap corrosive spray, and to return water lost as a result of electrolytic action. Their use in suitable conditions should result in reductions to battery-maintenance and replacement costs.

These functions depend on the existence of a closely-controlled constant potential system to limit gassing currents to about 3½A. If excessive over-charging occurs the Catylator can still destroy the hydrogen to reduce the risk of explosion, and it will prevent acid spray, but a certain amount of water replacement will be necessary to maintain the level of the electrolyte.

The Catylator units screw on to the top of each cell in place of the normal vent plugs. Construction is simple and there are no moving parts. They should enable the battery to be mounted in much closer proximity to the equipment it operates with reduced risk of damage by corrosion.

A future development envisaged is an integrated battery system in which Catylator control units will influence the constant potential charger to the extent that electrical energy is never used wastefully and destructively in the production of gas. This project will enable batteries to be sealed completely and so mounted inside the equipment; their life will be considerably extended. Moreover the system should automatically reduce the charge-rate to avoid increased gassing and resultant damage to the battery under conditions of high ambient and plate temperatures—this safeguard is not possible with conventional automatic regulators. No further information on such developments can be released at present; a full description will be published as soon as possible.

Standard Catylator units cost 5s. each. They are packed in sets of three and orders should state the make and type of battery to enable the correct screw thread to be supplied. The manufacturer is Catylators Limited, Weydown Road, Haslemere, Surrey.

Air Filter

THE Visco "K.M." air filter is claimed to be a lighter, more easily-cleaned, and more efficient version of the manufacturer's existing product.

Knitted galvanised wire mesh made from a flattened wire is used for filtration. This gives greater surface area for dust retention. Also, the layers of filter media are crimped to induce extreme turbulence of the air passing through the filter cell. This results in greater impingement of the dust particles on the oil-wetted surface.

The standard unit measures 20 in. x 20 in. and is approximately 2 in. deep. It comprises a sheet metal frame enabling any number of units to be bolted together to form a complete installation. The filter cell is of a channel section construction filled with filter medium which is retained between two sheets of flattened expanded metal.

The cell is held in position by two quick release catches which are also the handles. By simply pushing the handles flat against the cell it is locked securely into the filter frame. It is therefore only a matter of seconds to take out or replace a cell.

In operating the plant under site conditions, it is usual to have a certain percentage of spare clean and oiled filter cells which can be placed in position quickly and easily, thus ensuring that the filter plant is out of commission for a few moments only.

Under tests carried out on a gravimetric basis, the filter showed an efficiency of over 98 per cent.

All sizes of the filter are available in a vertical or inclined panel arrangement.

Further details can be obtained from the manufacturer, the Visco Engineering Co. Ltd., Stafford Road, Croydon, Surrey.

Simplified Colour Coding

COLOUR coding paints in a range of 10 colours, packed in 16-oz. aerosol containers are available for use with a specially-designed paint formulation with exceptional adhesion which can be applied to metals, wood, and plastics under a wide range of difficult conditions.

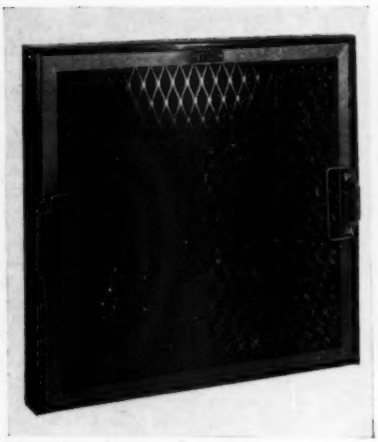
The 16-oz. aerosol is economical, portable and compact. Its contents are sufficient for coding many tons of stock. It allows easy application of paint in spots, bands or stripes and eliminates the necessity for carrying a collection of brushes and paint pots which require cleaning after use and so often spill or evaporate. The aerosol method makes colour coding under A.I.D. and B.S.I. standards extremely simple.

Further details can be obtained from the manufacturer, D.C.M.C., 2a, Parkhurst Road, London, N.7.

Portable X-ray Unit

THE Baltospot G 300D is a lightweight, portable industrial X-ray unit of 300 kV. capacity, designed for examination of mild steel of up to 3 in. thickness.

Both insulation and cooling of the tube is effected by a chemically and physiologically inert and non-inflammable gas. The use of this medium results in a lightweight tank head construction and achieves a high power weight ratio, the weight being 142 lb. and capacity being 300 kV. The unit can be supplied with either a conventional 40 deg. solid angle beam insert tube with a fine focus, size 3 mm. or a 360 deg. circumferential radiation insert tube. Cooling of the anode is achieved in each case by forced circulation of the insulating gas by internal blower.



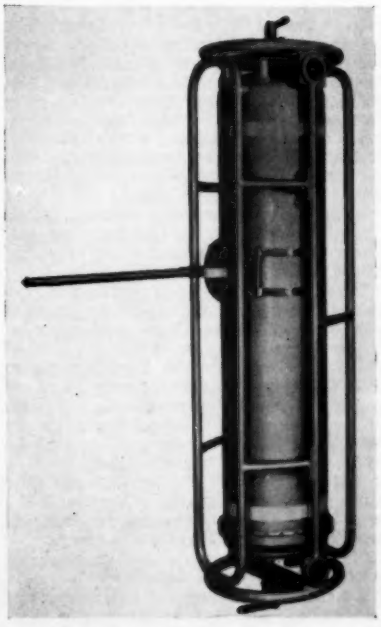
The tank head is pressurised and fitted with a pressure gauge. A cradle is supplied in which are incorporated anti-shock mountings. A thermo-switch in the tank head protects the tube against excessive heat and a device in the control unit gives a visual indication of overheating.

A particular advantage is that a series of exposures can be planned without risk of overheating.

Maximum dimensions are 40 in. x 9 in. dia. When fitted with the protective cradle, weight is increased from 142 lb. to 171 lb. The control unit is of the carrying case type, maximum dimensions being 18 in. x 14 in. x 8 in. Weight is 60 lb.

The control operates from a 220-V. 50-cycle single-phase supply and accommodates fluctuations of 10 per cent either way. It is fitted with direct-reading kV. and milliameters in addition to a synchronous timer which can be arranged for automatic repetition of exposures. The kilovoltage and tube current controls give continuously variable control.

Further details can be obtained from the manufacturer, Pantak Limited, Vale Road, Windsor, Berks.



Institution of Locomotive Engineers' Luncheon

British Railways modernisation plan and impact on overseas markets

The annual luncheon of the Institution of Locomotive Engineers was held at the Dorchester Hotel, London, W.1, on Friday last, March 4. Mr. R. A. Smeddle, M.I.Mech.E., M.I.Loco.E., President of the Institution, was in the Chair.

Dr. the Rt. Hon. Charles Hill, M.P., Chancellor of the Duchy of Lancaster, proposed the toast of the Institution in an amusing speech in which he compared locomotive engineering terms to those current in the medical profession. He also referred to the fact that Sir Brian Robertson, Chairman of the British Transport Commission, would be speaking later and pointed out that the day (on which the Guillebaud report had been published) was one which must call for considerable tact on his part. Parliament had always shown a keen if not always well-informed interest in railways. Dr. Hill said that he had seen from the current issue of *The Railway Magazine* that Members of Parliament had always shown much interest in railways, although the articles did not suggest that all Members were men of great talent. One, for example, had been described as chiefly eminent as a whist player and another was known for a duel which he had fought at Wormwood Scrubs.

One of the most splendid industrial achievements of the engineers of Great Britain had been the development of the locomotive. Much of the development of industry overseas had come from railway developments under the British locomotive engineer. Dr. Hill went on to refer to the film recently made by co-operation between the Locomotive Manufacturers of Great Britain and the Central Office of Information, dealing with British locomotive progress and which he said was having a world-wide presentation. This country did not always make the most overseas of its great scientific and industrial achievements. Everyone who went overseas on behalf of British industry was a potential public relations officer for this country which had a great deal to offer to the world.

Locomotive Exports from U.K.

During the past two years almost 1,000 locomotives worth about £20,000,000 had been exported from this country. The under-developed countries not only needed urgently the materials which could be supplied from the United Kingdom, but also qualified technical experts to assist them in their development and the United Kingdom was doing a great deal to meet this demand. Another way in which this country was helping the less well developed territories was in the training of young men. There were some 40,000 students from overseas in the United Kingdom at the present time and many of these were in engineering works of various kinds.

Dr. Hill concluded by saying that though his appearance was not angelic, he feared to tread such a thorny path as commenting on British Railways, but he would say that in his travels daily to London from Harpenden he had been given a diesel multiple-unit set in place of the services previously provided. He would only say, after referring to some teething troubles, that he felt it would be better to have a later advertised time of arrival which was kept than a better time which was not. On the other hand, he agreed that in regard to modernisation it was possible today to see the effects as a fact.

Mr. R. A. Smeddle said that the locomotive engineer was established in his place in the running of railways all over the world. The British Railways modernisation plan was catching up with deferred maintenance which had occurred since the war years. He paid warm tribute to Sir Brian Robertson for carrying out this plan and for the encouragement that he, as Chairman of the British Transport Commission, had given to all sections to proceed with this work as quickly as possible.

British Railways a "Shop Window"

Mr. Smeddle also referred to visits abroad by British Railway officers in the early days of the plan to see what could be learned in other countries. In fact, British Railways were building a new railway. Locomotives, carriages and wagons, whether they were built in the railway works or in the works of private manufacturers, would provide a shop window for Britain for the rest of the world to see. He looked forward to the time when the railwaymen of the world would come to this country to see what had been done.

Mr. R. Arbuthnott in proposing the toast of the guests referred briefly to Sir Brian Robertson and a number of the other Members of the British Transport Commission and its staff who were present as well as the other principal guests.

Sir Brian Robertson, Chairman of the British Transport Commission, who responded to the toast, said that he had warm feelings and respect for the Institution because it offered an opportunity for locomotive engineers, whether they belonged to British Railways or to private builders, to get together to discuss their problems. He was sure that there should be no barrier between these two sides of the profession. He thought it was remarkable that although most of those who were members of this Institution had been trained as steam engineers, they had proved themselves to be such good engineers that they had been able to change over to the new forms of traction and to acquit themselves so ably.

Modernisation of British Railways

He hoped that British Railways modernisation plan would continue to receive the support of the Government. He was sure that it was necessary to go forward quickly in the interest both of the Government and of the railways. The progress which was being made by British Railways would provide a shop window for overseas buyers and should be of great value to this country in the export field. He also promised that the British Transport Commission would continue to give the utmost aid to industry and would continue to make available its officers and to train students from overseas. Where else, he asked, would a railway overseas administration see such excellent comparisons of the working of diesel electric and diesel hydraulic forms of propulsion as in this country or, quite shortly would be able to see the progress which would have been made in electric traction. He referred also to the Electrification Convention to take place in the autumn of this year.

Mr. Smeddle then introduced Mr. Derek Brown, C.B.E., Chief Mechanical Engineer, Crown Agents for Oversea Governments & Administrations, as the next President of the Institution. He pointed out that Mr. Brown had served his time on the old Great Western Railway and at heart was still a railway man. His term of office would cover the period during which the Institution celebrated its fiftieth birthday.

Among those present were :

Messrs. A. R. Adams, E. A. Adams, W. M. Adey, J. F. Alcock, Colonel G. C. L. Alexander, Mr. L. B. Alexander, Professor D. N. de G. Allen, Messrs. R. M. Allen, W. F. Allen, G. A. Anderson, I. L. Anderson, B. W. Anwell, R. Arbuthnott, E. W. Arkle, J. Clubley Armstrong, R. I. D. Arthurton, A. F. Asbridge, W. J. Ash, G. A. Ashton, C. R. Atkins, D. Atkinson, E. Atkinson, R. M. Atkinson, V. Atkinson, C. S. Austen,

Messrs. B. Baker, E. H. Baker, S. E. Baker, N. D. Ball, H. P. Barker, D. A. Barnden, J. L. R. Barnes, R. Barr, G. M. Barrett, T. W. Barrow, Dr. F. T. Barwell, Messrs. A. E. Bates, H. Bayley, F. Beard, H. J. Beard, F. J. Bearman, F. H. Beasant, J. Beasley, J. E. Beckett, H. Bell, J. E. Bell, J. P. Bennett,

Sir John Benstead, Messrs. G. F. E. Best, G. S. Bingham, G. S. M. Birch, C. I. Birkbeck, C. N. Blakeney, R. W. Boardman, G. H. E. Bond, R. C. Bond, G. W. Bone, J. Bonham-Carter, Dr. A. Boschi, Messrs. E. T. Bostock, E. H. Bowers, H. G. Bowles, N. Bradshaw, W. B. Broadbent, K. P. Brockway, J. A. Broughall, A. J. S. Brown, D. C. Brown, T. W. Brown, J. G. Bruce, P. J. M. Buchanan, R. Bugler, A. Bull, C. F. Bullard, O. V. S. Bulleid, J. Burnham, M. G. Burrows, T. K. Burrows, H. L. Butler, R. Butler,

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Maj-General W. S. Tope, Messrs. W. L. Topham, C. L. Trask, E. D. Trask, M. S. Trenaman, Julian S. Tritton, A. W. Trow, R. M. Tufnell, F. Turner, J. Turner, K. D. S. Tyler, U Saw Ohn Tin, U Tun, C. W. B. Urmston, W. Vandy, Lt.-Colonel C. Vaughan, Messrs. R. L. Vereker, J. F. B. Vidal,

Messrs. C. C. Waddington, C. C. H. Wade, T. W. Wakefield, Major W. P. V. Wakley, Messrs. G. Walker, A. R. Wallis, A. F. Walters, J. R. Walton, Maj.-General Ll. Wansbrough-Jones, Messrs. R. W. Ward, S. B. Warder, W. H. Webb, R. E. G. Weddell, D. W. Wells, E. D. Wells, G. M. Wells, R. C. Whalley, J. E. Whatmough, F. M. G. Wheeler, H. A. A. While, E. N. White, E. T. White, H. B. White, H. E. A. White, S. White, S. I. White,

Messrs. E. C. Whiteley, F. Whyman, H. Wilcock, P. D. Wild, R. S. Wild, T. H. L. Wild, A. V. Wilkin, P. A. Willeard, A. Williams, D. S. D. Williams, Gordon Williams, P. Willmott, H. Wilmot, E. J. Wilson, G. A. Wilson,

Sir Reginald Wilson, Messrs. T. Wilson, W. H. Wilson, A. J. L. Winchester, J. P. Winder, F. H. Wood, G. K. Wood, J. A. Wood. L. C. Woodhouse, D. G. Woodman, W. A. Worth, A. A. Young.

QUEEN STREET STATION, GLASGOW, IMPROVEMENTS.—A new access stairway between the North Hanover Street entrance and No. 10 platform has been brought into use at Queen Street, Low Level Station, Glasgow, British Railways, Scottish Region. It provides an additional facility for passengers alighting from Airdrie, Springburn, and Bridgeton Central; also for passengers travelling from Glasgow to Hyndland, Milngavie, Helensburgh and Balloch. The stairway between No. 10 platform and Dundas Court will remain, but the centre stairway has been closed. These alterations are part of the plan for modernising Queen Street Low Level Station in preparation for electrification.

Great Northern Main Line Widening

Further plans to speed up passenger and freight services by removing bottlenecks on the main line from Kings Cross to the North have been announced by the Eastern Region of British Railways. A major step in this direction was taken with the completion last May of three new tunnels and an additional pair of lines between New Barnet and Potters Bar, but there are still eight relatively small sections of line on the 100 miles of route between Kings Cross and Stoke Tunnel, five miles south of Grantham, where there are less than four tracks. These are Welwyn to Woolmer Green; through Arlesey, Sandy and Huntingdon; Huntingdon to Leys; Connington South signalbox to Holme; Holme to Yaxley; and through Tallington.

The restricted number of tracks at these places limits the amount of passenger and goods services which can be timetabled and causes delays in running, particularly to goods trains. It is, therefore, proposed to widen the lines at all the places mentioned above except between Welwyn and Woolmer Green. Here, where it would cost several million pounds to bore two new tunnels and duplicate the 500-yd. long Welwyn Viaduct, an alternative route, via Hertford North, already exists.

Work has begun on the widening between Huntingdon and Leys, where there are now two down tracks and one up track. The additional track, the up slow, is being installed for a distance of just over three miles.

This stretch, together with the other 15 miles of new track to be laid, will then be able to cater for the increased number of trains planned for the future. Without such provision, these augmented services could only have been timetabled at the cost of extending the running times of freight trains which would involve using more rolling stock and additional train crews.

Swiss Summer Train Service

On the introduction of the 1960–1961 passenger services on May 29 next, certain important alterations will be made to trains in Switzerland. As the result of the altered "Simplon–Orient Express" working described in the February 19 issue, the eastbound train will leave Vallorbe at 12.31 instead of 2.50 a.m., and be accelerated 21 min. between there and Domodossola, including a time of 90 min. for the 90·5 miles from Lausanne to Brigue. The new "Lombardy Express" will follow from Vallorbe at 2.54 a.m., in much the same times as the present "Simplon-Orient." Westbound, the latter will leave Domodossola at 2.7 instead of 12.9 a.m. and run to Vallorbe in 2 hr. 43 min., 16 min. faster than now, with a 90 min. timing from Brigue to Lausanne.

New Franco–Swiss Car/Sleeper

A new car/sleeper train will run on Wednesday nights from Avignon at 10 p.m. to Zurich. The only advertised intermediate stop between Geneva and Zurich will be at Burgdorf, to give access to the Bernese Oberland. The return will be from Zurich at 9.30 p.m. on Thursdays, also with a Burgdorf stop. These trains will use the Altstätten Station at Zurich.

Changes on Gotthard Route

The working of the two sections of the "Riviera Express," a heavy night service which takes the Aarau-Lenzburg-Rotkreuz route between Olten and Arth-Goldau, avoiding Lucerne, and has no publicly booked stop between Basle and Bellinzona, is to be altered. Southbound, the first

section, at 2.51 a.m. from Basle (now 2.22 a.m.), will be called the "Italia Express," and will be composed of sleeping cars and through coaches from Copenhagen, Amsterdam, Ostend, and Calais to Rome.

The "Riviera Express" proper, with through portions from the same places (except from Grossenbrode instead of Copenhagen), will be for Milan and Ventimiglia; it will leave Basle at 3.15 a.m., 25 min. later than now, but be only 10 min. later into Milan, at 8.47 a.m. Similarly, northbound, its second portion will be called the "Italia Express."

The first portion of the principal morning express from Basle to Milan, at 6.25 a.m. from Basle and non-stop from Lucerne to Bellinzona, will have its name changed from "Scandinavien-Italien Express" to "Schweiz Express."

Swiss-German Services via Lindau

Partly with the help of through running by Swiss Federal electric locomotives over Austrian Federal lines between St. Margrethen and the German frontier station of Lindau, referred to in our February 26 issue, certain of the through expresses between Zurich and Munich *via* Bregenz and Lindau are to be faster.

The best acceleration westbound will be that of the "Bavaria," starting from Munich at 7.37 instead of 7.10 a.m., and unchanged in its Swiss times, with a 9 hr. run to Geneva; the eastbound "Rhone-Isar" also will be accelerated to a 9-hr. run, reaching Munich at 9.43 p.m.

The title "Wiener-Walzer" is given to the 7.18 p.m. sleeping car train from Basle (8.42 p.m. from Zurich) to Vienna *via* Innsbruck and Salzburg and the corresponding return service.

D.E.U.A. Members Visit Loughborough Works

Inspection of locomotives for British Railways and electrical products at plant of the Brush Electrical Engineering Co. Ltd.

Members of the Diesel Engineers & Users Association and their guests, numbering more than 70 in all, visited Falcon Works of the Brush Electrical Engineering Co. Ltd. at Loughborough on March 3. One of the primary objects was to inspect Brush 1,365 h.p. A1A–A1A diesel-electric locomotives in the course of production and testing for British Railways.

Mr. J. Calderwood, President of the Association, and Mr. A. P. Quarrell, Secretary, led the party which was welcomed by Dr. B. L. Goodlet, Managing Director. Messrs. R. G. Hooker, General Manager, A. L. Cramb, Sales Director, F. H. Wood, Manager, Traction Division, and F. H. Beasant, Deputy Manager, Traction Division, were among those who entertained the visitors.

Weekly Deliveries

Immediately on arrival at Loughborough Midland Station the majority were able to witness the taking-over by a British Railways crew, of two new 1,365-h.p. Type "2" locomotives destined for the Eastern Region and coupled in multiple-unit. This takes place regularly on Thursdays from the private siding adjoining the station.

After lunch a comprehensive tour of the plant began and practically every aspect of electrical manufacture was seen including individual components of traction generators, motors, and control gear. An outstanding item was a demonstration of automatic synchronisation and load-sharing between two Brush 21 kW. frequency changer sets with squirrel-cage induction motors and Rectifex voltage control with transductors. These were on test before delivery to the London Transport Executive to provide single-phase current at 33⅓ cycles per sec. for signalling circuits on the underground system. Skid-mounted control panels for L.T.E. motor-generator sets were also seen under construction. Rotating machines included a static-excitation alternator with a capacity of 2,750 kVA., the largest machine of its kind so far built in this country.

The 100th Brush main-line locomotive for British Railways, a Type "2" 1,365-h.p. A1A-A1A unit, being wheeled at Falcon Works, Loughborough

Manufacture of Transformers

In the transformer department, units ranging in size from 15 kVA. to 7,500 MVA. were shown at various stages of manufacture, including the first British flameproof Buxton-certified dry-type mining transformers intended for use at the coalface. These are mounted on flanged wheels with provision on the axles for adjustment to suit the rail gauge in use; they have a capacity of 200 kVA. and weigh 2·7 tons.

Switchgear for Electrification

Among the switchgear units inspected were 25 kV. single-phase cubicles for British Railways a.c. electrification in the Eastern Region, and low-tension outdoor distribution switchgear for the Central Electricity Generating Board. Equipment being wired with pre-fabricated harnesses included locomotive control panels each built as a complete unit carrying field resistances and the wheel flange-wear compensation device for the regulation of the driver's electric speedometer.

Inspection of the Traction Division included a tour through the super-structure, main- and secondary-erecting, and paint shops. Spacious well-lighted working conditions were particularly evident, and much interest was shown in the pre-fabrication of detachable locomotive-side panels, tanks, doors, and cab and roof sections, all of steel sheet. The traditional coach - building methods used require the installation of a minimum of heavy plant.

Footplate Runs

The tour ended with footplate runs on the test track with the 100th Type "2" locomotive built by the company for British Railways, Eastern Region; the illustration shows this unit being wheeled in the erection shop prior to the visit. At tea in the canteen, Mr. Calderwood expressed the thanks and appreciation of the Diesel Engineers & Users Association to the management of the Brush Electrical Engineering Co. Ltd., for making the visit possible. In reply Dr. Goodlet said that he hoped the guests had gained a good insight to the activities and interests of the company.

Questions in Parliament

Organisation of B.T.C.

Mr. A. E. Cooper (Ilford S.—Lab.) asked the Minister of Transport on March 2 if he would make a statement on the future financial aid and administrative organisation of the B.T.C.

Mr. Ernest Marples answered that he was not in a position to make a statement, but that he hoped to make one soon. A debate on the Guillebaud Report was a matter for the Leader of the House.

Mr. G. Nabarro (Kidderminster—C.): Cannot all Members be assured that there will be a debate well before the Budget so that the advance in the railwaymen's wages is not used as an excuse for failing to reduce taxation in the Budget ?

Mr. Marples: The question of a debate is for the Leader of the House.

Government and Railway Finances

Mr. Hugh Gaitskell, Leader of the Opposition, in the discussion of Parliamentary business on March 3, asked Mr. R. A. Butler, Leader of the House, when the promised Government statement on railway finances was likely to be made.

Mr. Butler: I cannot give an exact date, but it will be in the near future.

Mr. J. Grimond, Leader of the Liberals, asked whether there would be a debate when the Guillebaud Report was published.

Mr. Butler: First, we have to study and digest the Guillebaud Report and await the Government statement. Up to the present there has been no request from the Opposition for a debate on the railways.

Mr. W. Hamilton (West Fife—Lab.) suggested two debates, that on the railways and that on agricultural subsidies, on consecutive days, so that they could closely relate the £40 million given, or possibly to be given, to the railway workers with the £300 million given annually to the farmers.

Mr. Butler: I would not accept the word "given" in either case. The subsidy system for agricultural produce has been widely supported ever since it was first considered under the Labour Government in 1947. It is a solid basis for agriculture, which, I hope, will be respected. In the case of the railwaymen I think theirs is a claim which should receive the sympathetic consideration of the House. It should be considered against the general background of the railways and the economic position. I see no advantage in taking the two debates in juxtaposition.

B.T.C. Area Boards

Mr. Francis Noel-Baker (Swindon—Lab.) on February 25 asked the Leader of the House what was the membership and, incidentally, the remuneration of the Area Boards of the B.T.C. They had been told by the Minister of Transport that he could not give it because he was not responsible for Area Boards, and by the Chairman of the Commission that it was inconvenient to give it, though this sort of information was given by the chairmen of other nationalised corporations.

Mr. R. A. Butler: There has been a conference with my colleagues principally concerned with a view to trying to get the answering policy more co-ordinated between the Departments. My colleagues wish to approach questions in as sympathetic a manner as possible. That is why I suggest that we should give this matter a trial run.

Channel Tunnel

Mr. E. L.Mallalieau (Brigg—Lab.) asked the Secretary of State for Foreign Affairs on March 7, now that the investigations of the Franco-British group into the practical and economic possibilities of a tunnel under the Channel have been carried out, if he would approach the French Government with a view to facilitating its construction.

Mr. Selwyn Lloyd: The International Group which has commissioned the studies of the project has not yet transmitted its report to H.M. Government. We shall have to study it before taking any action.

Mr. P. Noel-Baker (Derby S.—Lab.): Will the Foreign Secretary assure us that we shall not have the objections on defence grounds which have always been put forward since the 1880's ?

Mr. Lloyd: That is a consideration which is present in our minds.

Staff and Labour Matters

Railway Pay Committee's Report

The report of the railway pay committee of inquiry was published on Friday, March 4. The report is in six parts with 22 appendices.

Our own summary is published on pages 301–304.

The members of the committee, under the chairmanship of Mr. C. W. Guillebaud, were Mr. E. Bishop and Mr. H. A. Clegg. Mr. H. A. Whitson was Secretary, and Mr. H. Slater was Assistant Secretary.

The observations and conclusions contained in the report will now be the subject of discussion between the commission and the three railway trade unions concerned.

The T.S.S.A. Executive Committee considered the report on March 6, and the General Secretary of the association afterwards stated that he had been instructed to inform the British Transport Commission and the other railway unions of his executive's decision to welcome the report as a whole. He stated: "We feel that the differential position is tied up with the overall increase so that the latter is the first thing to be dealt with. We think that the general increase should be given immediately and that where the suggestions for varying differentials are precise they should be given at the same time. Where they are imprecise there should be early negotiations."

Contracts and Tenders

Electric locomotive equipment for the Indian Railway Board

The English Electric Co. Ltd. has received a contract from the Indian Railway Board for the complete electrical equipments, including control equipment and traction motors, for the 3,600-h.p. 1,500-V. d.c. electric locomotives. They will be the first electric locomotives to be built in India.

The Canadian Pacific Railway has placed an order with the Dominion Steel & Car Corporation Limited for 300 70-ton 53-ft. 6-in. flat wagons, 100 of them equipped with end bulkheads.

Isca Foundry Co. Ltd., a subsidiary company of Eagre Construction Co. Ltd. of Scunthorpe, has received a substantial order for the first consignment of railway materials to Sir Robert McAlpine & Sons (South Wales) Limited for the new Spencer Works of Richard Thomas & Baldwins Limited, Newport, Mon.

British Transport Docks has placed a contract for the construction of two single-storey transit sheds at No. 12 Quay, King George Dock, Hull, with A. Monk & Co. Ltd., of Padgate, Warrington. Steelwork will be supplied and erected by the South Durham Steel & Iron Co. Ltd. as sub-contractors.

The Export Services Branch, Board of Trade, has received calls for tenders as follow :—

From Portuguese East Africa :

1 complete underframe for locomotive S.500.

The issuing authority and address to which bids should be sent is the Ports, Railways, & Transport Department, Lourenco Marques. The tender No. is 45/60. The closing date is May 6, 1960. A provisional deposit of Esc. 12,500 must be made by tenderers. The Board of Trade reference is ESB/4788/60.

From South Africa :

1 automatic hardening and tempering plant.

The issuing authority is the Stores Department, South African Railways. Bids in sealed envelopes, endorsed "Tender No. F.8079: Automatic hardening and tempering plant," should be addressed to the Chairman of the Tender Board, P.O. Box 7784, Johannesburg. Local representation is essential. The closing date is April 8, 1960. The Board of Trade reference is ESB/4865/60.

1 electric-motor driven heavy-duty axle journal re-turning and burnishing lathe.

The issuing authority is the Stores Department, South African Railways. Bids in sealed envelopes endorsed "Tender No. G.8175 : C. and W. Axle Journal Re-turning and Burnishing Lathes : Koedoespoort and Bloemfontein," should be addressed to the Chairman of the Tender Board, P.O. Box 7784, Johannesburg. Local representation is essential. The closing date is March 25, 1960. The B.O.T. reference is ESB/4875/60.

1 fully - automatic flash butt welding machine.

The issuing authority is the Stores Department, South African Railways. Bids in sealed envelopes, endorsed "Tender No. G.8080 ; Welding Machine," should be addressed to the Chairman of the Tender Board, P.O. Box 7784, Johannesburg. Local representation is essential. The closing date is April 8, 1960. The Board of Trade reference is ESB/4876/60.

From Iran :

700 *tonnes* of bolts for fastening rails to wooden sleepers.

The issuing authority and address to which bids should be sent is the Iranian State Railways, Tehran. The tender No. is 38/666. The closing date is April 9, 1960. The Board of Trade reference is ESB/4754/60.

From India :

25,975 tons of flat bottom 90-lb. rails, ASTM specification No. A1-56, or Indian Railway standard specification T-12-58

879 tons of fishplates, ASTM A49-55, or IRS No. T-1-57

100 tons of steel sheet piling.

The issuing authority is the Government of India, India Supply Mission, 2536, Massachusetts Avenue, N.W., Washington, 8, D.C., U.S.A., to whom bids should be sent, quoting tender Nos. B-1026 and B-1029. Copies of specifications and other documents relating to Indian calls for tender under I.C.A. aid can generally be obtained from the India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3. The closing date is April 20, 1960.

The Board of Trade reference is ESB/4968/60/I.C.A.

From Pakistan :

112 laminated springs, 10 plate C.W.D.

The issuing authority is the Eastern Bengal Railway. The tender No. is P6/EA1/27/58/ACST. The closing date is April 7, 1960. Tender forms can be obtained from the office of the Chief Controller of Stores, Eastern Bengal Railway, Pahartali, Chittagong, on payment of Rs.25 per set. No further information is available at the Board of Trade. The Board of Trade reference is ESB/5946/60.

1. 9,849 steel channels, class II
2. 15,746 angles, equal of class II steel
3. 14,784 angles, unequal of class II steel
4. 30,157 plain black sheets
5. 4,337 steel plates
6. 1,077 billets
7. (*a*) 15,516 draft and buffer springs, (*b*) 5,572 side buffer recoil springs
8. (*a*) 2,786 axles, (*b*) 5,572 tyres, (*c*) 5,572 glut rings
9. 1,393 18-in. cylinders, vacuum brake "E" type
10. 1,393 vacuum pipes.

The issuing authority and address to which bids should be sent is the Joint Director (Procurement & Development) Railway Board, Ministry of Railways & Communications, Room No. 302, 2nd Floor, Tughlag House, Sahrah Kamal, Atakurk, Karachi. The tender No. is PRS-59/WAG/7/TDR. The closing date for items 1 to 5 is April 16, 1960, and for 6 to 10, April 27, 1960. The Board of Trade reference is ESB/6393/60.

From Victoria :

720 sets of double-acting sliding door operating gear

Alternatively

1,260 sets of operating gear as above.

The issuing authority and address to which bids should be sent is the Secretary, Victorian Railways, Melbourne, C.1. The tender No. is 61643. The closing date is April 6, 1960. The Board of Trade reference is ESB/6349/60.

From Chile :

500 yokes for bogies of 50-ton wagons.

The issuing authority is the Chilean State Railways. Bids should be sent to El Senor Jefe del Departamento de Materiales y Almacenes, Sala de Propuestas, Estacion Alameda, Santiago, Chile. The tender No. is 18. Offers must be made on the official forms of the State Railways. The closing date is April 12, 1960. The Board of Trade reference is ESB/6432/60.

From Sudan :

6 24-in. pressure fans suitable for operation from three-phase 415-V. 50-cycle a.c. supply.

6 speed regulators suitable for the above item.

The issuing authority is the Sudan Railways Stores Department. The tender No. is 2137. The closing date is March 23, 1960. No further information is available at the Board of Trade. The Board of Trade reference is ESB/6427/60.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

MATHER & PLATT LIMITED RESULTS.—The group net profit of Mather & Platt Limited for 1959 was £850,751 (£712,022) and the dividend is 11 per cent (10¾ per cent equivalent).

Notes and News

Railway Students' Association Annual Convention.—Arrangements are being made for the Railway Students' Association Annual Convention to be held in Western Germany, from May 12 to May 18, with headquarters at Hanover.

British Railways Type "3" Diesel-Electric Locomotive.—In the article in our February 19 issue on the Type "3" diesel-electric locomotive built for British Railways by the Birmingham Railway Carriage & Wagon Co. Ltd., the speedometer, generator and mileage recorder were stated in error to have been supplied by Smiths Industrial Instruments Limited. The suppliers were in fact J. Stone & Co. (Deptford) Ltd.

Wages of Railwaymen and Road Haulage Workers.—In a table appended to the Guillebaud Committee Report on railwaymen's wages and designed to compare the railway labourer's basic wage of £7 16s. a week with those in other industries, the figure of £7 14s. is given for road haulage workers. The Road Haulage Association points out that the lowest possible basic wage for any adult road haulage worker is £7 19s., or 3s. more than the figure for railwaymen, and that even this applies only in a limited number of rural districts. In London the minimum basic weekly wage is £8 6s.

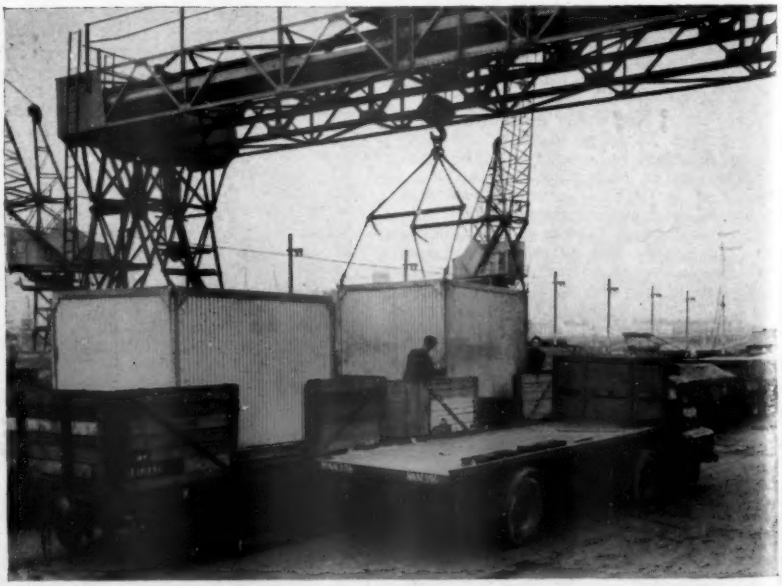
Deferred Payment Scheme for "Starlight Specials."—Passengers from Scotland travelling to London by the "Starlight Special" train this year can now book in advance by paying a deposit of £1. A booking made in this way carries with it, as in the case of a full-payment booking, the assurance of a guaranteed seat for the outward and return journeys. The balance of the return fare must be paid not less than 14 days before the outward journey. The passenger receives a voucher on payment of the £1 deposit. When the balance of the fare is paid the railway ticket is received in exchange for the voucher. The "Starlight Special" second class return fare to London is 85s. from Glasgow or Edinburgh. Bookings may be made at the "Starlight" offices at Glasgow St. Enoch and Edinburgh Waverley. Deferred payment facilities are also available at other Scottish centres from which "Starlight Special" trains have been arranged in connection with the local annual holidays.

Boulder on London–Brighton Main Line.—Trains to Victoria on the British Railways, Southern Region, main line from Brighton and the South Coast, were delayed for over an hour on February 26, when the 8.9 p.m. train from Littlehampton to Victoria struck a boulder outside Haywards Heath. The motorman reported the incident on arrival at Victoria. A search was made and the boulder removed. Down trains were not affected but drivers were advised to drive slowly past the spot.

U.T.A. Favourable Trading Balance.—The report of the Ulster Transport Authority for the year ended September 30, 1959, shows a favourable trading balance of £131,738. If it had not had to take over the lines in Northern Ireland of the former Great Northern Railway the trading balance would have been £330,756, or an improvement of £183,277 on the previous year's figure. This would have left net receipts of £137,956 after meeting loan charges, but because of the adverse situation of the G.N.R., the trading balance fell short by £384,403 of the total of £504,800, required for loan charges and dissolution expenses. Mr. G. Howden, Chairman of the U.T.A., pointed out last week that apart from the G.N.R., this was the Authority's best year. "We are out of the red and into the black for the first time since 1948 if it were not for the G.N.R.," he stated. "The merger with the G.N.R. has resulted in the U.T.A.

Inter-Continental Container Service

(*See editorial reference in our February 26 issue*)



Loading of containers at Nine Elms, British Railways, Southern Region, en route for South Africa via Southampton Docks on a stage of the inter-continental service

loan charges being increased by no less than £312,000, compared with the total amount of £192,800, which otherwise would have been necessary. The Authority, however, has no control whatever over this very large sum, the magnitude of which completely distorts the financial position." This is the first time the revenue results of the taking over of the G.N.R. lines in Northern Ireland have been reflected in the U.T.A. accounts.

Proposed Flats over South Kensington Station.—A proposal to build a block of flats with twin towers 100 ft. high over South Kensington Station, London Transport Executive, is under consideration by the planning department of London County Council. If approved the development is planned to be completed within three years. The lease from the L.T.E. is under negotiation.

British Railways Featured at Rockefeller Center, New York.—A British Railways display panel has been installed in the lobby of the International Building of Rockefeller Center, New York. The upper half of the panel displays a map of Britain's principal railway routes. The lower half clearly states, in the bold and definite colour scheme of red, white and blue, where information on British rail travel may be obtained. The panel is 34 ft. high and 8½ ft. wide. It is estimated that 75,000 people will pass the display window every year.

B.T.C. Travel Film Nominated for Hollywood Oscar.—"Between the Tides," a documentary film for travel promotion made by the British Transport Commission film unit, has been nominated for a Hollywood Oscar. This is the second year in succession that a B.T.C. film has been honoured. "Journey into Spring" last year also reached the final international list. "Between the Tides" was directed by Ralph Keene, photographed by Ronald Craigen and produced by Edgar Anstey and Ian Ferguson. It will compete for the Oscar with films which include Disney's "Mysteries of the Deep" and Peter Sellers' "Running, Jumping, and Standing Still."

Visit to Thermo Plastics Plant.—Mr. J. Morrish, Joint Managing Director, and officials of Thermo Plastics Limited and of Mendip Chemical Engineering Co. Ltd., received guests on a visit to the company's factory at Dunstable on March 8. The visitors were shown a comprehensive range of goods manufactured by various techniques including hand lay-up, pre-form and compression moulding, vacuum moulding, injection moulding and so on. The company produces components particularly for the refrigeration, aircraft, and catering industries. Among the products of railway interest are expanded styrene foam for thermal insulation; station name-lights; and plastic catering equipment, such as cups and saucers, food dishes and sandwich containers.

British Railways Campaign to Promote Scottish Tourist Traffic.—As part of a campaign to increase tourist traffic to Scotland a special display at the British Railways Travel Centre in Lower Regent Street, London, was initiated on March 7. It includes many exhibits featuring the Scots Guards. Among them are the saddle-cloth used by generations of sovereigns at the Trooping of the Colour, and a silver statue of the Queen on the drum-horse "Winston." Men of the Scots Guards are in attendance at the Travel Centre to answer questions. Colour films shown at the Centre during the display include the British Transport films "Coasts of Clyde," "Scotland for Sport," "The Land of Robert Burns," "Scottish Highlands," and "The Heart is Highland." The Scots Guards will take part in the tattoo at Edinburgh Castle during the International Festival this summer. Troops will travel to Edinburgh by rail. The theme of the London display accordingly is "The Guards' way to Scotland—British Railways."

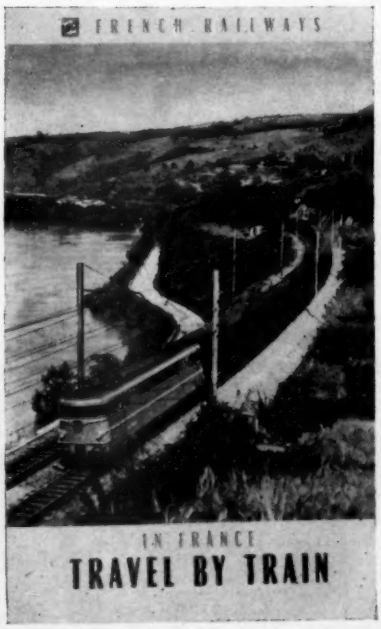
Change of Address of B.I.C.C. Panelec Heating Division.—The Panelec Heating Division of British Insulated Callender's Cables Limited, will be transferred, on March 7, to 83-85, Saffron Hill, London, E.C.1. Telephone: Holborn 3994.

Metropolitan Railway Surplus Lands Co. Ltd.—The Metropolitan Railway Surplus Lands Co. Ltd. has, through its Ortem Estates subsidiary, purchased nearly all of the Ordinary capital of Hale Property Trust. The price paid for the £1 Ordinary shares was £15 each, involving a total pay out of nearly £300,000.

Goods Train Derailment at Harringay Stadium Station.—Train services between Kentish Town and Tottenham were suspended during the evening of March 4, after the locomotive of a freight train was derailed outside Harringay Stadium Station, British Railways, London Midland Region. No one was injured.

British Transport Advertising.—British Transport Advertising as an essential link between television and point of sale advertising is the theme of the latest issue of *Transad News*, the magazine of the British Transport Commission Commercial Advertising Service. Double-page colour maps show at a glance how British Transport Advertising coverage complements that of commercial television. It is also shown that, while television advertisements are seen indoors, those on British Transport Advertising sites, on display outdoors, are seen by millions of customers as they go to the shops. Also included is a guide to the number of stations, buses, and vans in each television area. *Transad News* is distributed regularly to advertisers and agents throughout the country. Copies may be obtained free on request from Cranbourn Chambers, Leicester Square Station, London, W.C.2.

French Railways Publicity



Colour poster published by the French National Railways, showing express on main line electrified at 1,500 *V.*

C.T.C. on Carmarthen to Johnston Section, Western Region.—Editorial reference was made on page 238 of our February 26 issue to plans for installing C.T.C. between Carmarthen and Johnston, in the Western Region of British Railways. This line is still double track, and not single, as might have been inferred from out note. Installation of C.T.C. will enable certain sections of the line to be singled.

Road over Rail Plan for Midlands Motorway.—A three-mile viaduct carrying the road 45 ft. above British Railways, Western Region, tracks through Oldbury and Smethwick, is part of a proposed motorway link between Bristol-Birmingham and Birmingham–Lancaster motorways. It would cost some £4,000,000 for the three-mile stretch. The reason for the viaduct scheme is to minimise disturbance to property.

Photographers' Excursion from South Yorkshire to North Wales.—British Railways, Eastern and London Midland Regions, will run a diesel excursion train to Chester and Llangollen on June 19 for amateur photographers resident in South Yorkshire. The train will start from Doncaster, and pick up passengers at Mexborough, Rotherham, Masborough, Sheffield Midland, and Heeley. Additional window space is a feature of the stock to be used. A photographic competition has been arranged and cash prizes will be awarded for the six best photographs taken on the excursion. Entries will be judged by a panel appointed by the Public Relations & Publicity Officer of the Eastern Region.

Bridge Reconstruction at Hills Road, Cambridge.—During the reconstruction of the overline bridge at Hills Road, Cambridge, British Railways, Eastern Region, the job of positioning on the abutments 12 prestressed concrete beams, weighing from 24 to 13 tons and varying in length from 77 to 71 ft., and a steel-structure footbridge 96 ft. long, was done by two 25 ton lorry-mounted Coles cranes, of Pickfords heavy haulage service. The cranes were positioned on the abutments on either side of the bridge and, synchronised by loud hailer, lifted the beams straight from road vehicles on the bridge into position parallel with the road. Despite the size of the beams and the extent of the cranes' operations, traffic was kept flowing over the bridge by closing only one lane of the bridge and having the single-lane traffic controlled at either approach. Each lift had to be made between the passage of trains on the line below and by the following morning the operation was completed.

New Transit Sheds for King George Dock, Hull—British Transport Docks has placed a contract for the construction of two single-storey transit sheds at No. 12 Quay, King George Dock, Hull. The new sheds, each 500 ft. × 150 ft., will have steel frames and brick walls, and the roofs will be supported by single-span steel frames without the need for interior supports. There will be complete freedom of movement for mechanical handling appliances over a floor area of 150,000 sq. ft. Each shed will have nine doors facing the quayside and nine on the landward side; the latter will give access to railway wagon-loading platforms. There will be electrically-operated steel shutter doors at the ends of the sheds where internal platforms will be provided for dealing with road traffic. The main contract for the construction of the sheds and for the associated

rail and road works has been awarded to A. Monk & Co. Ltd., of Padgate, Warrington. Steelwork will be provided and erected by the South Durham Steel & Iron Co. Ltd. as sub-contractors. The new works are due for completion early in 1961.

Wagon Finance Corporation Limited Results.—The group net profit of the Wagon Finance Corporation Limited in 1959 amounted to £317,963 compared with £244,954 in 1958. The dividend is 21¼ per cent (17½ per cent).

Conference on Engineering Standards.—A conference of engineers responsible for standards has been arranged at the Connaught Rooms, Great Queen Street, London, for May 11. The discussion will include the practical problems met with in applying British Standards and the place of standards in production control. The conference will receive a report on the proposal made last year on the establishment in Britain of an association of those concerned with standards. The question of inch and metric sizes in international standards will also be discussed. Tickets may be obtained from: the Joint Secretary, I.Prod.E./B.S.I. Committee, 2 Park Street, W.1.

Film Shows for Waiting Travellers at Euston.—Five free film shows are being given in the Train Arrival Bureau for travellers with half-an-hour or more to spare and for people awaiting the arrival of friends and relatives at Euston, British Railways, London Midland Region. The shows are designed not only to entertain waiting passengers but also to help people plan holidays. Films of scenes in Britain and in many Continental countries are displayed. Screening takes place at 12.10, 1.10, 5,15, 6.15 and 7.15 p.m. each Monday and Friday until further notice. It is believed that this is the first time that such an experiment has been carried out at a London main-line station. Most of the films are in full colour and many of them have won awards at international film festivals.

Institute of Traffic Administration Dinner at Birmingham.—The annual dinner and dance of the Institute of Traffic Administration Birmingham centre was held last week at the Imperial Hotel, Birmingham. The toast of the Institute was proposed by Mr. R. C. Hilton, Divisional Traffic Manager, British Railways, Western Region, who praised the efforts of the Institute to widen the experience of the traffic man beyond the specialised sphere in which he might be engaged. Transport, Mr. Hilton stated, was always in the limelight, and particularly when things went wrong. Responding, Mr. A. T. Hills, Chairman of the Institute National Council urged local bodies of all kinds to make use of such organisations at the Institute, by calling on their experience in an advisory capacity when occasion might arise. Those present included Mr. W. P. James, West Midland Traffic Commissioner, and Mr. A. C. Gibson, National Secretary of the Institute. Mr. J. M. Gardiner, Chairman of the Centre, presided.

Forthcoming Meetings

March 14 (*Mon.*).—Institute of Transport at the Jarvis Hall (R.I.B.A.), 66, Portland Place, W.1, at 5.45 p.m. Paper on "The Channel Tunnel," by Mr. M. A. Cameron.

March 14 (*Mon.*).—Railway Correspondence & Travel Society, Northampton Branch, at the Liberal Club, Castilian Street, Northampton, at 7.30 p.m. Paper on "Rail tours and events of the past four years," by Mr. J. B. C. McCann.

March 15 (*Tue.*).—Institution of Locomotive Engineers, at the Institution of Mechanical Engineers, 1, Birdcage Walk, Westminster, S.W.1, at 5.30 p.m. Annual general meeting followed by a paper "The Class "25" condensing locomotives on the South African Railways—design and operating experiences," by Prof. Dr. Ing. R. Roosen.

March 17 (*Thu.*).—British Railways, Western Region, London Lecture & Debating Society, in the Headquarters Staff Dining Club, Bishop's Bridge Road, Paddington, W.2, at 5.45 p.m. Paper on "The Port of Bristol and railways," illustrated, by Mr. F. D. Arney, General Manager, Port of Bristol Authority.

March 17 (*Thu.*).—Institute of Traffic Administration, Glasgow Centre, at the Kenilworth Hotel, Queen Street, Glasgow, at 7.45 p.m. Annual general meeting and talk by Mr. J. H. Young, British Railways, Dundee.

March 17 (*Thu.*).—Diesel Engineers & Users Association, in the Institute of Marine Engineers, The Memorial Building, 76, Mark Lane, E.C.3, at 2.30 p.m. Paper on "Factors governing turbocharger design," by Mr. C. L. G. Worn.

March 17 (*Thu.*).—Institution of Railway Signal Engineers, Bristol Section, at Newport, at 6 p.m. Paper on "Structure and equipment design," by Mr. R. H. Stapley, British Railways, Western Region

March 21 (*Mon.*).—The Historical Model Railway Society, at Caxton Hall, Westminster, S.W.1, at 7 p.m. Impromptu evening on models, drawings and photographs, by members.

March 21 (*Mon.*).—Railway Correspondence & Travel Society, Merseyside Branch, at the Woodside Hotel, Birkenhead, at 7.30 p.m. Paper on "The Manchester to Sheffield electrification and the events leading up to it," by Mr. E. V. Richards.

March 22 (*Tue.*).—Institute of Transport, at the Connaught Rooms, Great Queen Street, W.C.2, at 12.15 for 1 p.m. Informal luncheon. Speaker: Mr. A. J. M. M. Crichton, Managing Director, Peninsular & Oriental Steam Navigation Company.

March 22 (*Tue.*).—Institution of Civil Engineers, at Great George Street, Westminster, S.W.1, at 5.30 p.m. James Forrest lecture: "Plastics in engineering," by Mr. R. Beeching.

March 23 (*Wed.*).—Railway Students Association, at the London School of Economics & Political Science, Houghton Street, Aldwych, W.C.2, at 6.15 p.m. Paper on "Wagons—their use and misuse," by Mr. F. C. Margetts, Assistant General Manager, British Railways, North Eastern Region.

March 23 (*Wed.*).—British Railways, Southern Region, Lecture & Debating Society, at the Chapter House, St. Thomas' Street, S.E.1, at 6 p.m. Reading of prize essay and annual general meeting. Mr. C. P. Hopkins, General Manager, and President of the Society, in the chair.

March 24 (*Thu.*).—Permanent Way Institution, Nottingham & Derby Section, in the Midland Hotel, Derby, at 7 p.m. Paper on "Visit to Russia," by Mr. A. H. Emerson, Electrical Engineer, London Midland Region, Derby.

March 24 (*Thu.*).—The Model Railway Club, at Keen House, Calshot Street, King's Cross, N.1, at 7.45 p.m. Paper on "The Vale of Rheidol Railway," illustrated, by Mr. C. R. Wood.

March 26 (*Sat.*).—Railway Correspondence & Travel Society, Cheshire Rail Tour.

March 26 (*Sat.*).—Railway Students' Association. Visit to Brush Electrical Engineering Works, Loughborough.

Railway Stock Market

Budget uncertainties dominated stock markets, and share prices have lost further ground, though this was attributed more to falling off in demand than to selling. There is growing talk that the Budget may reimpose hire purchase restrictions, though the prevailing view is that the Chancellor of the Exchequer will not increase taxation.

Reflecting mainly the trend of Wall Street markets, Canadian Pacifics have come back from $46½ a week ago to $44⅜, at which there is yield of almost 6¼ per cent. The 4 per cent preference stock at 56½ were little changed on balance, though the 4 per cent debentures receded fractionally from 64⅜ to 64⅛. White Pass shares eased to $13⅜.

Nyasaland Railways shares remained at 10s. and the 3½ per cent debentures were 50½. West of India Portuguese stock was quoted at 112 with the 5 per cent debentures 94½.

Among foreign rails, Antofagasta ordinary and preference stocks were 14¼ and 29½, respectively. United of Havana second income stock kept at 6, San Paulo Railway 3s. units at 1s. 6d., and Mexican Central "A" bearer debentures were 59½.

In other directions, Costa Rica ordinary stock was 30 with the first and second debentures 90 and 93½ respectively. Brazil Railway bonds kept at 8, and Guayaquil & Quito assented bonds were quoted at 78. Paraguay Central prior debentures were 15½ and Chilean Northern first debentures 58.

International of Central America common shares were quoted at $31 with the referred at $125¼.

Shares of locomotive, engineering and kindred companies have been reactionary with the surrounding market trend. Birmingham Wagon reacted to 41s. 6d. awaiting further news of the merger talks with Charles Roberts. The 5s. shares of the latter company, after falling further to 14s. 6d., firmed up to 15s., at which there is yield of 5 per cent on the basis of last year's 15 per cent dividend. North British Locomotives were 10s. 6d., but Beyer Peacock 5s. shares have strengthened to 8s. 7½d. Gloucester Wagon 10s. shares eased to 16s. 4½d. after announcement of the interim dividend. Wagon Repairs 5s. shares were 12s. 9d., while Westinghouse Brake at 51s., compared with 51s. 9d. a week ago.

Broom & Wade 5s. shares were 18s. 10½d., and Holman Bros. 10s. shares 23s. 3d. G. D. Peters remained at 20s. 7½d. and in other directions, Davy-United came back to 107s. 6d. with Power Gas 10s. shares at 90s. 7½d. Vickers receded from 35s. a week ago to 33s. 9d., Cammell Laird 5s. shares were 8s. 7½d., and Stone-Platt at 61s. 9d. eased 6d. on balance. Guest Keen at 86s. were 1s. 9d. down; even so, the yield is only 3 per cent, which indicates the widespread expectations of higher dividend prospects. Clarke Chapman eased from 59s. to 57s. 9½d., but Babcock & Wilcox at 42s. 6d. were the same as a week ago. T. W. Ward moved slightly easier at 153s. 9d. G. & J. Weir 5s. shares lost 10½d. at 19s. 7½d. at which the yield is nearly 4¾ per cent.

Pressed Steel 5s. shares at 39s. 6d. were virtually unchanged compared with a week ago. Dowty Group 10s. shares eased from 55s. 4½d. to 55s. Associated Electrical at 58s. 6d. were slightly higher on balance. English Electric eased to 41s. 6d.xd. and General Electric to 38s. 6d.xd. Crompton Parkinson 5s. shares were steady at 13s. 1½d.